Practical Training

for

Athletics, Health, and Pleasure

By
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B.A., M.D.

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ATHLETICS, HEALTH, AND PLEASURE.

BY

RANDOLPH FARIES, A.M., M.D.,

DIRECTOR OF PHYSICAL EDUCATION IN THE UNIVERSITY OF PENNSYLVANIA; PRESIDENT OF THE INTER-COLLEGIATE ATHLETIC ASSOCIATION OF AMATEUR ATHLETES, 1886, 1887; INTER-COLLEGIATE CHAMPION MILE RUNNER, 1884, 1885, 1886; INTER-COLLEGIATE CHAMPION HALF-MILE RUNNER, 1887; CAPTAIN OF THE ATHLETIC TEAM OF THE UNIVERSITY OF PENNSYLVANIA, 1887; LEFT END UNIVERSITY OF PENNSYLVANIA FRESHMAN FOOTBALL TEAM, 1881; LEFT FIELDER UNIVERSITY OF PENNSYLVANIA BASEBALL TEAM, 1884, 1885, 1887, 1888; ATTENDING SURGEON TO THE ORTHOPÆDIC DISPENSARY UNIVERSITY OF PENNSYLVANIA.

WITH ILLUSTRATIONS.

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PREFACE.

THIS book is written to meet the wants of those who desire to be guided in taking exercise for health, and those who wish to train for athletic contests of all kinds.

The contents consist of explanations of the effects of exercise on the body; pointing out the benefits received by judicious exercise, and at the same time warning the athlete of the dangers arising from excessive physical work. Useful hints on "training," obtained from fifteen years of practical experience, and many ideas, gathered from some of the best trainers and athletes of the leading colleges, athletic clubs, gymnasiums and schools throughout the United States, Canada, and England, are presented to the reader, which are of inestimable value.

The topics which will be discussed are: exercise in general, stiffness and its treatment, bathing, rubbing, diet, sleep, habits, fatigue, overwork, the treatment of sprains, strains, ruptures, contusions, abscesses, and fractures, the skin, and training so as to "condition" one's self for all kinds of contests.

The book is based not only upon sound medical principles, but also the author's practical experience as a teacher of "physical education" to boys and young men. It points out how weak constitutions may be strengthened, predispositions to disease eliminated, certain diseases cured, and deals with the dangers and abuses of exercise, showing how to avoid them.

I wish to express a sense of deep gratitude to Mr. William B. Curtis, Mr. George D. Gideon, Mr. James S. Mitchell, Mr. Frank P. Murray, Mr. Lawrence E. Myers, Mr. Hugh C. Baxter, Mr. C. T. Buchholtz, Mr. George Orton, Mr. Everett J. Wendell, Mr. Wendell Baker, Mr. William Byrd Page, and Dr. J. K. Shell, because I owe a great deal of this book not only to their ability as athletes, but also to the many courtesies extended to me, and the personal friendship of some of them.

THE AUTHOR.

PART I.

CHAPTER I.

EXERCISE IN GENERAL.

HUNDREDS of persons exercise daily never knowing what the effects of the exercise they are taking are, and why these effects take place. To understand fully the therapeutic value of exercise requires a thorough knowledge of medicine with an exceptionally good knowledge of physiology and anatomy. When taking exercise, in a general way, one should always seek to gain health, not strength. Health and strength are closely allied, but they are by no means the same. Many men are possessed of very strong intellects, yet they are not healthy. Some men are also muscular giants, but when carefully examined, it is found that different parts of their body, such as the heart, the nervous system, the lungs, and the kidneys, are far from healthy.

No person should take any exercise that requires a greater expenditure of energy than the body is able sufficiently to repair. Judgment in this respect is a most potent factor for accomplishing good or evil, according as it is used or abused by the person exercising.

No person ever injured his constitution in any way by judicious exercise. It is the injudicious who suffer.

Every person should have a purpose in exercising, and should follow a regular course in physical training, seeking to obtain a healthy, strong and symmetrical body. The proper kind of exercise to be taken can be mapped out only by an expert with medical assistance; there is absolutely no danger, and great benefit results, if the prescribed course be strictly adhered to.

The way exercise benefits a weakened part of the body is by sending new blood to the part. The blood itself may be enriched, by taking wholesome food; and this fact should never escape the minds of those who anticipate a course of physical culture.

Pure air and water, sleep, ventilation, clothing, bathing, sunlight, and good habits, are also important aids to bodily health and strength; in fact, they play as important a part as exercise itself.

All general exercise should be taken in moderate amounts at first, and there should be a regular progression from the simplest to the most intricate and severe. The weak parts should receive especial attention until the body attains perfect symmetry; after this, increase in development should be sought for every part of the body, in order that no part may suffer. Should one part of the body receive greater attention than another, the former will become weakened in the exact ratio that the latter is strengthened.

Exercises may consist of free movements or move-

ments with apparatus. Every muscle in the body can be developed without a single piece of apparatus, but some persons will not exercise unless they use some of the many pieces of apparatus found in a gymnasium.

Persons who prefer to go to a gymnasium should never use a piece of apparatus without being instructed as to the group of muscles it is intended to develop. When attending a gymnasium be sure that the instructor is a competent one, in order that more harm than good may not be the result of your exercises. If necessary, consult a physician as to your general health.

Through the influence of any kind of exercise the small cells which compose the bodily tissues are brought into greater activity and in this way nutrition is increased. This takes place because the quality of the blood is improved by exercise. The immediate effects of exercise, on the blood, are to produce too much carbonic acid; but the after effects differ greatly, and instead of finding, after exercising, an excess of carbonic acid, which is a poisonous product, we find an increase of oxygen, which is a food.

Exercise accomplishes a great deal of good by increasing the combustion in our bodily tissues, and during exercise we find the process of respiration going on more rapidly in the lungs, skin, muscles and blood; that is, in these tissues we find a greater absorption of oxygen and more elimination of carbonic acid.

The person who exercises provides himself with an extra amount of oxygen, and in so doing purifies his

blood, because oxygen gives greater vitality to the red corpuscles found in the blood. The purified blood is carried by exercise to the different tissues in our body; and receiving better blood, they become stronger.

Muscular work also regulates the nutrition in our bodies in a great degree, and when taken judiciously its tonic effect is equal to, and in a great many instances better than, that of drugs. Exercise is the most natural and best tonic one can take, and when the quantity and quality have been properly regulated, its salutary effects are of the greatest value.

If exercise is benefiting the individual the body will feel the need for it, and the longer one remains inactive the more will this need be felt. When exercise of one's body is greatly neglected there takes place in the human machine a great accumulation of reserve materials; and from this accumulation there is also brought about a diminution of products which are necessary to maintain health. From these conditions there results an impoverishment of the constitution. When we find a person of sedentary habits, we are almost sure to discover some complaint, because nothing leads more quickly to disease than an absolute neglect of exercise. Most persons who have sedentary occupations suffer with obesity to a greater or less degree. If they were to take systematic exercise and pay strict attention to their diet, cutting off all farinaceous foods, as well as those containing sugar, they could soon rid themselves of this condition. Moreover, they would not be likely to

suffer with gout as they grow older. The goutiness is caused by an insufficient combustion of the nitrogenous materials in the body and by a lack of exercise.

The less one exercises the more susceptible will the constitution be to the poisonous effects of the waste materials, and the more quickly will these products accumulate. The more exercise one takes, within reason, the greater will the power of resistance be to the effects of these materials.

General exercise is often productive of pain at first, which is due to the poisonous effect of the waste materials; but if the person exercising has the courage to continue his exercises for a week or so, pain will disappear, and will not return unless the exercises be omitted for a long period. Exercise in a general way tends to modify the constitution of those who take it, so that all the parts of the body perform their functions and perfect health results. The benefits of exercise are not the same in all cases because all constitutions are not alike, and great importance must be attached both to the quality and quantity of work. Some persons take exercise regardless of quality or quantity, and more harm follows than good.

The quality should be such that it will strengthen the weak parts of the human motor, and the quantity should never be so great that it produces exhaustion. The effects that are produced upon the body by taking general exercise do not differ from those when exercise is localized, except in the matter of quantity.

For the benefit of those who take general exercises it may be well to tell them to be careful not to bring too sudden a strain upon the blood vessels, heart and lungs, lest a rupture may be caused. Ruptures have been caused by a disregard for this advice, and even ruptures of the heart itself have occurred when least expected.* "A porter at Bordeaux had made a wager that he would lift a full hogshead. In the superhuman effort he made to raise this enormous burden his heart was ruptured and he dropped down dead."

By taking general exercises all the muscles in the body not only increase in size, but also in beauty of form. This is because the blood vessels carry more blood to them, thus ridding them of the products of dissimilation, at the same time aiding them in the assimilation of new material. Exercise in its general effects upon the heart and lungs strengthens these organs in precisely the same manner that muscles are strengthened; not only is the capacity of the lungs increased and the heart-beats made stronger, but both of these organs acquire a power of endurance much greater than they possessed prior to being influenced by general exercise. Persons who take general exercise never become deformed; they are never troubled with narrow, hollow or "chicken-breasted" chests, their shoulders do not droop, their spines are straight, and they do not suffer so easily from fatigue as those who develop only special parts of the body.

Fernand Le Grange, Physiology of Bodily Exercise. (p. 308.)

Mental operations have a great deal to do with all exercises which are voluntary, and under no condition should a person who is suffering from brain overwork pursue a course of exercises which is voluntary. The exercises in such cases should always be involuntary, that the mind may not be called into action. When mental effort is required by an exercise, the brain becomes much heavier owing to the increased amount of blood sent there, and frequently great harm results because an absolute mental rest was needed.

On the other hand, when an exercise is of an involuntary nature, the blood is drawn from the brain to the part used, e. g., the upper or lower extremities, and in this way the brain receives a thorough rest; moreover, since it receives less blood, it also becomes cooler, because diminished combustion is the direct result of diminished blood supply, and since there is a reduction in temperature, the brain is less excitable.

If we wish to strengthen the mind of an individual, voluntary exercises should be prescribed, and the exercises should be very intricate so as to demand a great deal of thought and analyzation. The more difficult a voluntary movement is, the greater will be the development of the mind. Care should be taken in dealing with intricate voluntary exercises, in order that the production of waste materials may not be excessive, and so affect the eliminating organs too greatly.

It is a very easy matter to tell when the waste materials are in excess, because the urine will present a

turbidity giving a brick-red sediment. Should this condition continually exist, it is better to make the exercise milder or stop it. Usually the turbidity of the urine will disappear in a short time, from three or four days to two weeks, provided the exercise is taken daily, and the person exercising is not rheumatic; even then it will become clear if exercise is continued for a longer time, unless leading to exhaustion.

Variety of exercises does not fatigue a person so quickly as a single exercise. This is because one part of the body may be at rest while another is being exercised. When the heart and lungs are brought into action, as for example by running, then fatigue manifests itself very quickly. If little or no work be done by these organs more benefit results by changing from one kind of exercise to another than by continuing to use one group of muscles, and fatigue is less apt to be felt.

After exercising there is need for repose, to enable the body to reconstruct the parts that have been used. Many persons make the mistake of eating immediately after exercising, but in doing this there is danger of drawing too much blood from the muscles to the digestive organs. The muscles will not be thoroughly reconstructed if too much blood be taken from them for the purpose of digesting food. At least an hour should intervene before any food is taken, and there is absolutely no need for taking food then, unless the exercise has been one requiring a great deal of endurance.

If the period of rest be too short, the repair of the tissues will suffer greatly, and there will be too great retention of waste materials. For the hygienic care of the body the person who takes exercise should be very careful to adjust his time for exercise and rest, so that he may avoid all dangers brought about by insufficient repair and incomplete digestion. The amount of rest one should take after exercising is variable, and must be regulated by the effects it has upon the different parts of the body. If the exercise be gentle, then the period of rest will be short, because the necessary amount of repair is small; but when the exercise is violent or prolonged, the period of rest must be lengthened according to the severity of the exercise and its duration. Rest is very essential where a great abundance of waste materials is produced, especially so since these cause a great deal of pain to one unaccustomed to physical work. Pain will disappear very quickly when rest is taken; this is very easily accounted for by the fact that, having ceased to exercise, the waste products are not produced in sufficient quantities to cause more pain.

Rest is also very essential for the nerves throughout the body. They are subjected to a great deal of work during exercise, their fibres receive shocks, and there must be enough time intervening to allow the nervous tissue to repair itself just as muscular tissue is repaired. Rest also allows one to re-accumulate the energy which has been expended during the periods of exercise. The

most perfect rest is sound sleep. Lying upon one's back for a time will be sufficient for most cases, and in a great many instances sitting upon a chair, bench or stool will suffice.

Persons who exercise violently, frequently begin another exercise before allowing sufficient time for rest, and are compelled to cease during this second period because they learn that their judgment has been at fault. A good rule to be guided by, in all exercises which call for great endurance, such as running a mile or two very rapidly, or where the exercise is very violent, is to allow at least an interval of a half to three-quarters of an hour after the heart-beats and respirations have returned to the normal. The time it will take these organs to return to the normal cannot be defined, for it varies greatly in different persons. One may usually allow from ten to twenty minutes.

Where an exercise necessitates an extremely violent effort it is well to remember that the expenditure of energy takes place rapidly, and the effect cannot be sustained very long; therefore it is best to learn the art of concentrating all of the bodily powers so as to make them work as a unit in order that the best results may be attained. Good examples of the foregoing may be seen in athletes who wrestle, play football, row, box, run and walk.

Persons who exercise regularly do not get tired easily, and they can stand a great amount of work before fatigue overtakes them. The greatest predisposing

cause of fatigue is inactivity. Too much rest makes men lazy; they grow fat and are easily exhausted by exercise. The slightest exertion makes them so stiff that they can scarcely get out of bed the next morning. Frequently they are overtaken with a slight fever after exercising, which resembles either typhoid in its very early stage, or intermittent. The symptoms they have are as follows: appetite impaired or lost, irregular impulse of heart, pallor of skin, headache, nervousness, causing sleeplessness and slight fever; and if the exercise has been so violent that it has produced exhaustion, the throat becomes dry. Frequently there will be a slight cough which leads to bronchial or pulmonary complaint. If exercise be taken as it should, the following conditions will result: there will be increase in appetite, regularity of heart-impulse, increased pulmonary capacity, bright color of skin, increase in size and tone of muscles, increase in bodily weight, and sound sleep.

All persons, when exercising, should remember that every movement of the body is simply a physical expression of a nervous impression produced either by the brain or spinal cord, and in all voluntary movements the primary impulse starts from the brain; hence, movements develop not only physical but cerebral powers. If a person wishes to arrive at a healthful development of his body, he must begin with the primitive type of exercises and gradually advance in alphabetical order, just as a child does when it is taught to read.

A proper coördination of any movement depends upon a proper state of the mind; hence, we see that if the mental faculties are not in a condition of stability, the body, as a whole, is not in harmonious accord with the mind. If an exercise is to be correctly performed, it must be based upon the temperament and character of the person who is about to perform it, so that all departments of his being will work in harmony. It is in this way alone that the human organism will become capable of perfect development, thus bringing its several parts into perfect harmony.

There is a limit to the powers of every being upon earth, and with man it will be found that this limit is fixed by his bodily powers, as well as by his mental faculties. If a movement be applied incorrectly, the faculty of an individual will not infrequently be perverted, and therefore such a movement is injurious and detrimental to symmetrical development. Healthful power is due to a simultaneous action of all parts of the body. From this we observe that the terms physical force and perfect health are correlative, since both depend upon harmony among all parts of the human organism.

If one will begin with the simplest kind of exercise and gradually advance, in regular progression, he will be able, in due time, to accomplish feats that were impossible at first, and without danger of injuring his constitution, because he will acquire an instinctive knowledge of what he is capable of doing. Ignorance of this is a frequent cause of disease.

If we classify the different phenomena that take place in our bodies, we may put them under three heads—mechanical, chemic and dynamic. The first include circulation, deglutition, mastication and respiration; the second, nutrition, sanguification, secretion, excretion and assimilation, and the last are merely evidences of the mind which we see in our intellectual and moral powers. Every vital act, no matter how small or how great, is produced under the combined influence of these processes, and it is by their conjoint action that a perfect organization characterizes itself; moreover, when this action is disturbed, an alteration in functions takes place, and this, in nearly every case, is followed by disease.

If the harmony of any one part be deranged it may be re-established by increasing the vital activity of the part, this being accomplished more perfectly by exciting the blood current by exercise, than in any other way, thus supplying a natural means which is physiologic in nature, instead of using drugs that are therapeutic in their nature, and used to change pathologic to physiologic conditions.

Many persons do not care to be shown a series of free movements, because these movements are so simple; but it is frequently from their simplicity that the good is derived. Exercises can be prescribed which will not only strengthen and develop the weak parts, but which also correct the worst kinds of deformities. Hundreds of persons know how hard the struggle for

life is, how many hardships, trials, disappointments and a thousand and one other things each individual is constantly subjected to: hence, what is necessary? *Health.* This is the key to all success; and without this, man's accomplishments are far from what they should be.

As we grow older we find our struggle for knowledge and existence grows harder and harder, we have to encounter many things that test our brains beyond their limit, we become worried, the stimulation to succeed is too great, we are apt to work too long, sleep too little, allow little or no time for our meals, our frames easily become tired, and finally our nervous system, no longer able to supply us with impulses, gives way, and we find disease has overtaken us. Is not the remedy for this very simple, when one realizes that disease could have been avoided by physical exercise properly indulged in? Exercise seeks to establish a proper balance between mind and body. Exercise is not for the purpose of attaining strength to accomplish great feats, but aims at bringing the whole body into such perfect symmetry and harmony that each person may pursue his calling with pleasure and usefulness to all.

There are thousands of men, uncomplaining, eager, earnest and faithful, who are following their vocation, suffering with low spirits, languor, pain, fatigue, fearing lest their nervous system will give way, and in fact with their whole body impoverished, when good health easily could have been possessed by a little careful and well-regulated exercise.

One must not mistake strength for health; they are often used as interchangeable terms, yet they are not the same; a person may be healthy and lack strength, or may be strong and not possess health. Strength may be manifested by one system of the body; e. g., nervous, muscular, circulatory, digestive or osseous. There are many consumptives who have great muscular strength, yet they do not possess health. Health is freedom from disease, or still better as Dr. Richardson puts it, "perfect organization in perfect action."

Too often men and boys seek to gain strength without the slightest regard for their health, and in so doing permanently injure their constitutions. Most men seem to think the development of the body in a special way is all that is needed. Frequently we see a man or boy with large arms and chest, while his legs seem scarcely able to hold up his body, so poorly are they developed. There is a weakness in one part of the body, while in the other there is an excess of strength; consequently local exercise does not yield health, because it strengthens one part at the expense of another. This teaches us to be general in our exercises, and not to specialize.

The life work of every human being requires that every part of that being should be in the best possible condition. There is no occupation, no state in which one may place himself, no position in life, in which a well-cultivated body will not be of extreme value. Every day men falter, not because they are slaves to their calling, but because they never exercise. Would

it not have been better to have acquired a little bodily stamina and thus have been able to finish the work they began, than to have left it to another?

Some argue that a healthy, vigorous body, and an active, bright intellect are incompatible. Such is not the case. Science long ago confirmed the fact that the body assists the brain. "That the intellect can rarely attain, or if it already possesses, can rarely long retain a commanding height when the bodily functions are impaired; that the body itself will be at its best and most worthy condition when its claims are most fully shared by mental occupations, and that the healthy condition of the mind, produced by sufficient and natural employment, will react most favorably upon the body, can never be doubted for a moment; yet we continually find the one warring upon the other. We shall find the reason for this in the overlooking of the laws which govern both body and mind. The mind acts through a material organ—the brain—upon which it is entirely dependent, and which, in common with the other organs of the body, is subject to constant decay and constant renewal from the same vital fluid; these processes being accelerated and its strength and vigor consequently augmented in proportion to its activity. But in common with other organs also, if this activity is carried beyond certain limits, its waste exceeds nutrition, its strength gives place to weakness. The mind then, is dependent upon the blood for its material support, and its healthy action is dependent on its

receiving an adequate supply of healthy blood. Moreover, the organ of the mind being subject to the same laws as other organs, requires similar alternations of rest and action to maintain it in its natural state of efficiency ; and if either of these states be deficient or in excess, the brain, and consequently the mind, will deteriorate. If, therefore, the cultivation or exercise of the mind be neglected, it will, of necessity, be weakened in precisely the same manner as the other organs are weakened by insufficient use, will deteriorate both in strength and vigor and the power of enduring fatigue. If, on the other hand, the brain's exercise be excessive, beyond the point where the nutrition equals the waste, it will suffer in the same way and to the same extent that other organs would do." (MacLaren.)*

The brain should never be overworked, nor should the body be subjected to such an abuse. Strive to seek moderation in all things, at the same time remembering that there is a limit to mental and physical capacity. By keeping within certain limits it is possible to reach a point of activity, vigor and self-application, which will impart to the body the power of enduring work with the greatest ease. Until middle life, the older we grow the greater will be the endurance of the body to withstand physical and mental fatigue, because it will possess a superfluous amount of health and energy.

As long as the mind and body are healthy, just so long will they contribute to the health of each other.

* Archibald MacLaren, Physical Education. (p. 27.)

The man who possesses the best natural tonic in the world—a clear conscience—never suffers from physical exercise when properly taken. It is the brain worry and dissipation that kill, not the bodily wear.

Persons who have never taken systematic exercise should begin with the simplest kinds of exercise, such as free movements and calisthenics. After following a course in these for about six months, exercising daily (Sunday excepted), they may take up light gymnastics, and follow these for a year or a year and a half, after which heavy gymnastics may be indulged in. Should the strength of constitution not be sufficient to take up some of the more advanced and severe exercises, then it is best never to take any kind of exercise except in a mild form. Keeping within the dictates of reason is a very good rule to go by, especially when an individual is inclined to exercise too severely.

Emulation often crops out among persons who take exercise, especially among members of the different gymnasiums throughout the United States and Europe. One or more members frequently will endeavor to perform a feat that their teacher has shown them, and in so doing will receive an injury which may weaken the constitution for life. The feats that usually cause trouble should never be undertaken, unless there has been a long apprenticeship.

The young men and boys who go to the gymnasium —I mean those under twenty-one years of age—are the ones who suffer most. They are very fond of displaying

their strength, and frequently they try to accomplish a feat far beyond their strength, simply because they try to accomplish something a man five or ten years their senior does, in order to be put on a par with him physically.

Too many men and boys exercise for strength and not for health; they try to see how many times they can "chin" themselves at the horizontal bar, or how often they can "dip" upon the parallel bars, utterly regardless of the effect it is going to have upon their constitution, and by so doing frequently lay the foundation of an incurable disease.

Young men should be especially careful in exercising until they are of age, because growth and development take place so rapidly between fourteen and twenty-one, that a great deal of energy is required for these processes alone. Many a boy grows from two to six inches between puberty and manhood, and frequently he will outgrow his strength. After he is twenty-one he will begin to fill out, and by the time he is twenty-three or four he finds he has gained from twenty to forty pounds, and in some cases even more.

It is true some persons are well developed when they are born; but we shall find a reason for this by making inquiry into their family history. Their parents and grand-parents have been accustomed to taking exercise all their life; hence it is no wonder some children are robust and healthy. This is far from what is found in the great majority of cases; and instead, the offspring

has been born of parents who never exercise, and in addition, in many instances, there is an hereditary taint. These are the children and young men and women who need especially to be guided by medical advice and a competent instructor.

Parents should not be surprised, when no guidance is sought, if their children suffer from the effects of overwork, exhaustion, and misapplied exercises, which lead to weakness, disease and deformity. Parents should be just as particular about their offspring's physical condition as they are about its mental training. Let a parent once get the idea that his child is not receiving the mental training it should in the school it attends, and quickly enough will that child be sent to another school. Such is not the case when the children attend a gymnasium. They usually do what they please, choose their own exercise, take as much as they like and as often as they wish, without any medical advice. Is it surprising, after a short period — say two or three months—to find these children showing signs of chronic fatigue and becoming nervous, their skin growing paler and paler, and instead of becoming stronger, as they should if the exercise were properly prescribed, they grow weaker and weaker, dark rings manifest themselves about their eyes, appetite is poor, food badly assimilated, the children are restless, sleep is disturbed, and finally typhoid fever, lung trouble, wasting of muscular tissue, nervousness and deformities follow? Parents can never be too careful in making a selection, because

in the greater number of gymnasiums and schools for physical culture there is no medical advice given and the instructors are empirics.

Children rarely inherit a perfectly erect, symmetrical, graceful physique. This is because, for generations, the muscular system of mankind has been neglected, while mental occupations and society consume life.

Is it not the duty of parents to see that their children shall possess a muscular and nervous system which shall enable them successfully to cope with the many problems of life they are sure to encounter as they grow up and go out into the world to fight their own battles? The drooping shoulders, the defective walk, the narrow chest, the pale countenance, the weak nervous system, the poor digestion, the rheumatic joints, the crooked spine, the deformed ribs, the weak lungs and heart, are, in many instances, directly traceable to an undeveloped and weak muscular system.

Many persons do exercise *some* muscles, and a fair appetite and comfortable sleep follow, the final result being a satisfied feeling as to the muscles employed; but this sort of work accomplishes nothing more than a deformity, because a few groups of muscles will be overdeveloped, while others are being weakened, and if the exercise has used the muscles of one's back, we find as an ultimate result that the chest has been actually contracted. There is less room for the heart and lungs than there was in the beginning, and this frequently

predisposes one to disease of these organs. Could the young men, women and children of the present generation have inherited strong physiques, thousands of them would not know what headaches, poor nerves, weak lungs and irregular heart-impulses are, and would never have been troubled with the diseases and deformities I have already mentioned.

Is there one of us who does not know of scores of men, women and children whose very expression and pale face point to a poor physique and an absolute want of nervous and muscular stamina ; who are always pale, always tired, never gain a pound of flesh, and who drag through their daily work, only too glad when bedtime has arrived — and all this due to a lack of exercise accompanied by the proper medical advice ? Is it surprising that the doctor meets with so many cases of nervous exhaustion which lead to a shattered condition of every part of the body ?

More than one characteristic is inherited from one parent or the other, and frequently the temperament, the color of the eyes, the walk of the father, the voice of the mother, her mental capacity and disposition crop out in the child. One child will inherit the constitution of the father, who is strong and robust, while another in the same family will inherit that of the mother, who is weak and delicate. Now to these predispositions to disease, add want of exercise, bad air, poor ventilation, unwholesome food, eating rapidly, poor mastication, lack of bodily care in clothing and bathing,

and is there any cause for surprise when disease overtakes the child?

Ask any comparatively healthy man or woman, boy or girl, to run a mile or two, and how many would be able to do it? Not one in a thousand. And why? Because they do not possess enough muscular stamina in conjunction with a well-developed pair of lungs and a strong heart.

Children who have been born of consumptive parents may be so benefited by exercise that they will enjoy a happy life; and also be useful and capable of taking care of themselves as they go through life without ever being overtaken by the disease, if exercise be rightly prescribed. These cases should be kept out in the open air as much as possible; too much study should not be indulged in, exercise should be under the care of a competent teacher and the guidance of a physician, and the strictest attention should be paid to every law of hygiene. The same treatment will also apply to all persons who inherit diseased or weak hearts and nervous troubles, as well as those suffering from dyspepsia, rheumatism, gout, and an impoverished condition of their blood.

If parents only knew how greatly systematic exercise would protect them as well as their children from ill-health, they would consult their physician more frequently, and then exercise as well as compel their children to care for their own bodies; but it is not until they find disease or deformity overtaking their child that

they go to the doctor, only to be told that all the trouble might have been avoided.

Think of the vast numbers of fathers and mothers who have spent thousands upon thousands of dollars in educating their children mentally, but who never devote a single day to their offspring's physical training. Alas, when the time arrives for these children to become bread-winners, or shortly after, parents begin to see the mistake, because their children cannot do the work required of them.

Just here may be mentioned a very sad case. The parents were both lacking in bodily development, but were far above the average mentally. The boy was sent to school, and inheriting a good mind from both parents, was naturally fond of study. While at school he stood first in his class, but took almost no exercise from the age of five or six until his death. After going through school and doing remarkably well he went to college and continued to be a most ardent student, the result being that he led his class. During this time his mind was receiving a superabundance of work, and his body was being neglected, almost entirely, with the result of giving him an extremely poor and weak physique. When he was graduated from college, he took up the study of medicine, and for the first two years also led his class, but as he entered upon his third and last year he began to suffer from the prolonged effects of the mental strain he had kept up during all of his lifetime. Toward the close of the year he began to fail rapidly, but by ceasing his

studies for a short period recuperated sufficiently to pass his final examinations, not however at the head of his class. He then went abroad for his health, and seemed to be benefited a little. After his return he took up the practice of medicine, but the work soon began to tell upon him and he had to give it up. Two years after this he died. A good many more cases of the same kind could be mentioned.

Look to it that the body is properly cared for, so that your hopes for your own child may not be shattered. Parents naturally feel complimented when told that their children are bright, and especially so when the child stands at the head of his or her class in school or college. You may realize too late that your child's muscular stamina has been sadly neglected, or what is still worse, that disease has attacked the child's physique, and impaired its career.

If your child is troubled with any nervous disease, heart, lung, or other complaint, for which you have consulted your physician, and he has advised you to have your child take systematic exercise, have it done under his direction, and put the child under a person who is thoroughly competent to instruct it in the kind and quantity of exercise your physician has prescribed. Consult the physician whenever it is necessary for the welfare of the child. Few parents know that exercises are capable of producing bodily weaknesses, diseases and deformities, as well as strengthening the body, curing the diseases, and correcting the deformities. Such

weaknesses and diseases are the result of overwork of one or more parts of the body, while the deformities are often due to using the muscles ignorantly.

I have seen many and many a person whose chest was narrow and contracted use a chest-weight incorrectly by standing with his back to the apparatus, exercising the muscles of the chest, when he should have faced the apparatus so as to use the muscles of the back. This is simply one instance of hundreds of cases of misapplied muscular action.

CHAPTER II.

STIFFNESS AND ITS TREATMENT.

EVERY person who is unaccustomed to exercise suffers in a greater or less degree from stiffness when the work has been violent, and many persons are the victims of stiffness although the exercise has been extremely gentle. Those who exercise regularly never know what stiffness means. Severe stiffness is very painful, and is the direct result of taking violent exercise without due preparation. It may last from one to two weeks, and sometimes is the cause of boils which are the result of the breaking down of muscular tissue with subsequent suppuration. This condition of affairs is brought about by the shocks the muscular fibres receive when they have not been exercised properly.

Stiffness may be so intense that it will produce the following effects: headache, pain, diminished muscular power, nervousness, restlessness and loss of appetite, accompanied by a dry throat, coated tongue, dry skin, slight fever and sleeplessness. These effects disappear gradually, and during this time there is an extreme antipathy to taking any exercise. Stiffness in its milder

forms does not affect the body so severely. Nothing manifests itself beyond a slight pain in the muscles, which passes off in a short time and is hardly noticed.

It may also be either local or general, according to the parts of the body used. The man who wrestles, plays football or baseball, when not prepared by training, suffers from general stiffness, because he uses so many groups of muscles. When a man walks five or ten miles stiffness is felt in the legs, and perhaps the back, and is localized.

Stiffness never manifests itself immediately after exercise ; in fact it does not appear until some time after the muscles have been exercised, usually being felt from one to twenty-four hours afterward. The ratio of stiffness to fatigue is not the same in every case, and an exercise that will cause extreme stiffness in one person may not have the slightest effect upon another. This is to be explained by the difference in strength of the constitutions. The condition of the individual is the factor that regulates the degree of stiffness.

According to books on physiology, stiffness is due to the production of lactic acid in combination with the elements of flesh, this combination being called *sarco-lactic acid.* When there is an excess of this acid the muscular contractions are diminished, and the muscles do not regain their normal contracting power until the acid is eliminated.

An explanation for stiffness which does not coincide with physiological views is that of Le Grange. "Stiff-

ness is due to the shocks the muscular fibres receive as the muscles are exercised." This would not account, however, for the fact that stiffness occurs when the exercise has been so moderate both in quality and quantity that the muscles practically have received no shocks, or when stiffness follows a cold shower-bath no exercise having been taken.

Persons who suffer from stiffness frequently find the degree of stiffness affecting a group of tendôns more than the fleshy parts of muscles ; sometimes the reverse condition will manifest itself. I have had persons tell me that the elasticity of the skin directly over the stiff muscles was affected. It is possible that such may have been the case, and that the skin may have suffered from the poisonous effects of some of the products of dissimilation.

Excessive exercise is not only capable of producing a very severe degree of stiffness, but it may also affect the power the nerves possess of transmitting impulses to the muscles ; because the nerves suffer from the effects of the same poisonous substances that diminish muscular contractility, the sensation being one of pain when the athlete endeavors to use a number of stiff muscles, making its effect felt upon will power, and in this way influencing the brain of the individual to a certain degree.

Every one who has ever suffered from a severe degree of stiffness knows perfectly the amount of will power he was forced to use in order to overcome the

pain, and how often this must be repeated so as to get the stiffness to wear off. Many persons have endeavored to drive stiffness away by exercise, but have failed simply because they had not the courage to endure the extreme pain caused by becoming more stiff for a few days. Had they been determined enough they would have mastered the situation, and after a few more days the stiffness would have diminished, finally disappearing, thus fitting the individual for the severest and most violent exercises without exposing him to the least danger of becoming stiff thereafter.

My own experience with stiffness may serve to explain the topic of this chapter in a measure. I well remember the first time I ever ran on my toes. I was surprised to find how much easier it was to run this way than on the flat of my foot, how much farther I could stride, and the spring I could get with much less exertion. After completing the distance I took my usual bath and received a good rub. It was in the afternoon. The next morning upon rising I found the calves of my legs so stiff I could scarcely walk. Instead of getting out of bed immediately, I began to rub the stiffened calves because I had not the will power to get up and walk. After rubbing for some ten or fifteen minutes I managed to relieve the muscles of some of the trouble, and finally arose and dressed. I continued to run upon my toes daily, and for about a week I suffered. After that time I could run upon my toes without experiencing the slightest discomfort.

For the benefit of those who suffer from the same severe degree of stiffness, let me say that I hope you will persist in the exercise, no matter what it may be, until your muscles have been so well trained that no degree of exercise will make you stiff.

Local stiffness frequently manifests itself in a neighboring group of muscles, which have not been used. Often a person will exercise his legs, doing little or no work with his back, and his back will be as stiff as his legs, if not more so. There is need of an explanation for this, and we shall find it is made clear by the fact that when the legs are exercised poisonous products are produced, which are taken up by the blood vessels, and thus find their way to other muscles before being eliminated by the different organs of excretion. These products are composed for the most part of chemical substances known as urates and uric acid. There has been a great deal of difference of opinion in regard to the production of these waste materials by exercise, some asserting that exercise increases the deposits of urates, while others say it diminishes them.* Guyon and Lecorché say the deposits are increased, while Bronchard and Béclard deny it. The writer has found an increase in these deposits after exercise, especially if the examination were made from four to six hours after training. In making this statement I am dealing with persons who are healthy, not with those who may have some hereditary taint, which

* Le Grange's Physiology of Bodily Exercise. (p. 118.)

leads to rheumatism, gout, and nervousness. When stiffness is very slight the urine will show little or no brick-red sediment ; but if it be severe, then the urine will contain this in excess, and it will often be some days before it clears up by ridding itself of the poisonous substances. The condition of one's system has a great deal to do with the amount of urates and uric acid, some persons being very susceptible to their poisonous effects, while others seem to have a perfect immunity to them. At all events it is better to take exercise slowly and in small amounts, and exercise a little each day, so as to avoid the unpleasant and painful effects of stiffness which are sure to follow when too much exercise is taken.

It may be put down as an infallible rule that exercise increases the power of resistance the muscles possess in regard to stiffness, while abstaining from exercise makes the susceptibility of the muscles to stiffness greater.

Nervous worry and excitement will produce an excessive production of these products of decomposition ; therefore the athlete who trains will have a great advantage over his adversary, if he can keep cool, and he will not subject his nervous system to the bad effects of these substances.

Violent exercise in a person unaccustomed to exercise always leaves a great amount of uric acid in the blood, which makes itself felt by poisoning the surrounding tissues.

The treatment of stiffness is by no means a thing to be overlooked, and, moreover, I may say that there is a right way and a wrong way to do this; a scientific way based upon medical knowledge and an unscientific way based upon ignorance and experimentation. Stiffness, when treated from a medical standpoint, can be easily overcome and with much benefit to the individual; but when treated unskillfully is liable to be productive of bad results. The application of scientific rubbing, which is one means of treating stiffness, will be found in the chapter on that subject. Men who suffer from stiffness are often rubbed too hard, too long and in the wrong way by trainers, who know absolutely nothing about massage, physiology or anatomy; and in addition they use some rubbing stuff which is often more productive of harm than good. Further, these men will frequently rub the skin so hard that it becomes sore from the shocks it receives, and moreover, leave different parts of the body suffering with a raw surface. Many trainers imagine that a man must be rubbed hard in order to make the skin and muscles tough; in fact, I have had them tell me so more than once. It is far from beneficial and pleasant to have one of these men rub you so hard that a raw surface is the result, and afterward apply some rubbing stuff which is very painful and which in extreme cases is so irritating that you cannot stand its application.

Now and then a trainer is met with who has good judgment, and is fully aware of the danger of too much

rubbing and spurious rubbing stuffs; and this is the man who always accomplishes a great deal of good on behalf of the men that he is training.

When suffering from stiffness, never allow a person to rub you who transmits unpleasant sensations to you; also see that his hands are clean before he begins his work. Filthy hands are often the means of communicating disease, and are far from pleasant to a man who has been accustomed to cleanliness.

Trainers will tell you they have a panacea for stiffness, and that their rubbing mixture is by far the best to be had. My advice to you is to beware lest it do more harm than good. All rubbing mixtures should be based upon medical knowledge, and any mixture that is not, is worse than none at all, since in the latter case no harm can result. For general purposes plain alcohol, witch hazel, or whiskey, is as good as any. Should there be a great deal of pain accompanying the stiffness, then one may use chloroform liniment. If the part has a sluggish circulation, use a stimulating liniment made with camphor or tincture of aconite. Should the case be a mild one, soap liniment will answer the purpose; either warm or cold water may also be used. It is more than likely that the good results obtained from the use of water are due more to the rubbing than to the water. When using rubbing fluids care should be taken, after the part has been moistened, not to rub too hard as the part becomes drier and drier. In this way the rubber will not cause

the athlete pain by having the hair upon his limbs, back, or chest stick to his trainer's hands. Athletes have suffered from the discomfort of this, and should any of my readers ever have the same experience, the unpleasantness may be avoided by telling the trainer to rub more gently as the part becomes drier. Before being rubbed pain may be greatly relieved by the application of hot water ; this however is only necessary in extreme cases, and I shall speak more of it in detail in the chapter upon baths and bathing.

A good, thorough rub once a day is usually sufficient for those who exercise, and the best time to be rubbed is shortly after exercising. It is a good plan to give the athlete a gentle rub just before exercising, because it warms the body sufficiently to enable the muscles to act to a much better advantage. When stiff, a rub just before retiring will be of some benefit and should never be omitted until the stiffness has disappeared, and even then there may be found persons who prefer to be rubbed before retiring. The best way to regulate the number of rubs and their duration is according to the effects they have upon the body. If they have a stimulating effect and are never followed by depressions, then two or three a day will not be productive of bad results. Should the reverse be the result, then one rub a day or even every other day will suffice. The time it takes a good trainer to rub an athlete well is about twenty minutes to a half hour at first, say for the first week ; after this, from ten to fifteen minutes will be sufficient.

The athlete should, after receiving his treatment for stiffness, invariably be thoroughly dried in order that he may not expose himself to the danger of taking cold. This I have known to happen to more than one athlete, simply because he had been neglected.

Should stiffness remain in one or more parts of the body after receiving the proper treatment, it is best to consult a physician, because rheumatism, a rupture of a tendon or some of the muscular fibres may be mistaken for stiffness. In such a case careful medical and surgical care is needed, because no amount of rubbing will cure such a condition. Many first-class athletes allow minor complaints to run into major troubles and thus ruin their muscles for life, when if they had consulted a physician such would not have been the case.

Stiffness of tendons does not disappear so quickly as stiffness of muscles ; more care should be given to the former, so that an additional trouble may not find its way to the covering of the bone by which the tendon is indirectly attached to it. Should such a condition occur, then the athlete will find himself in for a siege of trouble, and may be overtaken with bone disease through his own carelessness.

When a person has exercised so severely that the pain resulting from stiffness is excruciating, further exercise should be discontinued and a warm or even hot bath taken until the pain has been greatly relieved, the bath being repeated daily until the stiffness has disappeared. If exercise is begun after this and the

stiffness returns, then the same plan must be adopted ; but it is a rare thing for such a condition of affairs to present itself a second time.

Under no conditions should a person exercise when stiff, to such a degree that an abscess of the muscles follows. This condition only presents itself in extreme cases, and should it occur the best and quickest way to get rid of it is to rest and have the abscess properly treated.

Novices must use their judgment when taking exercise, and be especially careful to take small amounts at first, gradually increasing the amount. In this way they will not only avoid severe stiffness, but will also eliminate the danger of rupturing a tendon or some of the surrounding or adjacent tissue.

It is impossible to avoid stiffness absolutely when training for the first time, unless one has had some general exercise during previous years, and even then a slight degree of stiffness is liable to make itself felt. The more severe degrees of stiffness, however, will never be felt if a little care be taken, and this more than compensates for the time spent in taking exercise in small and moderate amounts.

In order that athletes may be impressed with the importance of the treatment of stiffness and avoid its unpleasant effects, I will repeat the most essential points. In the first place a good, hot bath will take away the pain and soreness of the muscles. Rubbing is another factor that plays no small part in relieving

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the muscles of their stiffened condition. The application of such liquids as alcohol, whisky, witch hazel, fusel oil, olive oil, and water with a little ammonia in it, all tend to add great comfort, when properly uscd, to the individual whose muscles suffer from a stiffened condition. A teaspoonful or two of any of the above may be poured into the hand of the trainer who rubs you and applied to the part, after which a given amount of rubbing is done until the part becomes perfectly dry. This should be repeated at least once, and if necessary twice. If necessary, every part of the body should receive the same treatment, in order to keep every muscle in its best possiblc condition. Lastly, be sure that the body is perfectly dry and the skin in a glow before dressing. In taking thesc precautions a cold will often be avoidcd, which might follow when the foregoing course is ncglected. For drying the skin thoroughly, flesh gloves and towels, either smooth or rough, may be used.

CHAPTER III.

BATHING.

THE question of taking a bath after exercise or training is of no small importance, and frequently harm results because some small point has been neglected. One time the water will be too cold, thus producing too great a shock; another, the bather will remain in the bath too long; in a third instance, the bath is of the wrong kind; and, lastly, the individual takes too many baths.

There is no iron-clad rule in reference to bathing. Some persons can bathe three or four times a day, while others are able to bathe but once a day, or every other day. One person may prefer a cold shower bath; another, a lukewarm bath; a third, a plunge bath; a fourth, a douche bath; a fifth, a sponge bath, and a sixth, a steam bath.

The best rule to be guided by is to take the bath or baths one has been accustomed to all his life. Never be guided by the advice of a friend in regard to the kind of a bath you are to take, because it may do you more harm than good. I am acquainted with a person who was advised to take a very cold shower bath by a

friend, who had been greatly benefited by this kind of bath. The person who was advised was of a nervous temperament, but had a fair strength of constitution, yet immediately after stepping under the shower he received such a tremendous shock that unconsciousness resulted. A physician was summoned, and found it necessary, in order to overcome the shock, to give electricity, apply hot-water bags to the spine, sides of chest, limbs and feet, and administer drugs hypodermically, working with the patient for two hours before overcoming the shock. This is an extreme case, but illustrates fully how careful persons should be when taking a kind of bath that they have never taken in their whole lifetime.

One bath a day should be sufficient for those who exercise, and it should be taken shortly after exercising. Should this be too enervating, then a bath every other day, or every third day, may be taken.

It may be well to enumerate baths in general, and then consider them in detail. They are cold baths of various kinds, such as the plunge bath, shower bath, douche bath, sponge bath and needle bath; warm baths, hot baths and steam baths ; Turkish, Russian and medicated baths.

Probably the most frequently used of all these baths for ordinary purposes is the cold shower bath. That good results follow a cold shower bath can not be denied ; but equally bad results follow when one's strength of constitution is too weak to stand the sudden

shock I have already referred to. The manner in which a cold bath accomplishes its beneficial effects is by flushing the internal organs and nerve centres with an additional quantity of blood, at the same time driving the blood, in a measure, from the skin and muscles, thus giving them a temporary rest, by diminishing the amount of oxidation in these tissues. Bathers must not endure the temperature of a cold bath too long, in order that the body may not receive too great a chill externally, while the internal organs are being too greatly congested. From half a minute to two or three minutes is long enough for any one to remain in a cold bath, no matter what the nature of that bath may be, whether douche, shower or plunge. After coming out of a cold bath the skin should be thoroughly dried, paying especial attention to the spaces between the fingers, toes, backs of the ears, and under the armpits, so as to avoid any danger of taking cold. After drying the body in this manner the skin should be thoroughly rubbed, either with a rough towel, flesh brushes, or the hands, until it is in a glow ; then apply pure alcohol all over the body, and rub until dry. Those who follow this method will not run any risk of catching cold, and will always find their skin in fine condition. This process of drying, rubbing, and the use of alcohol so tones up the skin and opens the pores that it returns to its normal condition ; while if the body simply be dried without rubbing, and alcohol applied, the pores are liable to retain enough chilled perspiration to produce a severe cold.

During my own experience of training, which extended over a period of ten years, I suffered from the neglect of this more than once. Moreover, I have known and seen dozens of similar cases.

Persons should not use all sorts of rubbing fluids after bathing, but should content themselves with alcohol. It is the best one to use ordinarily, and will answer the purpose in most cases. It has a stimulating effect upon the skin, and never clogs the pores as do many other rubbing fluids. When the case is an extraordinary one, do not use a rubbing fluid that has been recommended by some kind friend, but go to a physician and get him to prescribe the proper liniment or lotion. Never use any fluid that will affect the skin so greatly as to make it raw and irritate the flesh. This mistake has been made more than once by applying something that was entirely too strong. Additional rubbing fluids are witch hazel or Pond's Extract, weak ammonia water, whiskey, whiskey and rock salt, weak vinegar, whiskey and alum, whiskey and tannic acid, and alcohol and tannic acid. These solutions should contain from thirty to sixty grains (which is equivalent to a half and to one teaspoonful) of alum or tannic acid, to the pint of whiskey or alcohol as the case may demand. Many athletes prefer the weaker solution, while others lean toward the stronger.

Bathing not only affects the skin but also the blood vessels in it, as well as the muscles, nerves, nerve centres and internal organs. The direct effect of a cold

bath is to produce a chill sensation on the surface of the body, and nearly every person who has ever taken a cold bath knows what the expression *goose flesh* means.

Those who are accustomed to a cold bath, know how they will instinctively shudder before going under or into the water, and at the same time their lungs are involuntarily expanded beyond their normal capacity. Moreover, if the person were to count the number of his heart-beats and respirations, he would find them slightly increased. Further, there is a sense of exhilaration which produces a slight degree of mental excitement. After bathing, a reaction of the different organs and tissues of the body begins. The cold sensation gives way to a sense of warmth, the mental excitement disappears, the skin, instead of possessing a pallid appearance, grows redder and redder until it is in a glow, and after a while the functions of the body return to their normal condition. When a cold bath has been of very short duration, little or no depression follows; but if this period extends beyond five or ten minutes there is great danger of shock, since more energy in the form of combustion must be expended to allow all the bodily functions to regain their normal condition. It is far better to spend five or ten seconds in taking a cold bath than five or ten minutes, because in the former case no evil is likely to result, while in the latter great harm may be done.

Warm baths act in just the opposite way on the body that cold baths act. Instead of stimulating the

different functions of the body they facilitate their work. The bodily temperature is raised somewhat during a warm bath, but not enough to cause any inconvenience unless the bath be too hot or too prolonged. While taking a warm bath we find the blood vessels dilated in the skin, and the skin gives off a certain amount of water. When the temperature is very high it produces a faintness with which many of my readers are familiar. After taking a hot bath great care should be exerted in wrapping the body in a blanket or sheet in order to prevent the blood vessels, which are thoroughly dilated, from contracting too quickly, and thus prevent any tendency to internal congestion. Warm baths are invariably to be prescribed when an athlete is suffering with stiff or overworked muscles, so as to allow them to regain their suppleness.

Persons who exercise and bathe directly afterward should remember that there are three classes of constitutions to be dealt with, and that the kind, degree and duration of the bath must be regulated according to the constitution to be considered. The first class includes men with strong, healthy, robust bodies. These men are so constituted that they can take any kind of a bath and are benefited. The second class is composed of persons who are weak in some part of their body, and for whom a careful prescription should be given by a physician, in order that the bath may be the proper kind. The third class includes persons

with idiosyncrasies; and, by way of illustration, I may mention the case of a friend of mine who possessed excellent health and strength, yet he could not take any kind of a bath but a lukewarm one, if he wished to be benefited. As he said to me, "A cold bath is too cold and chills me, a hot bath is too warm and weakens me, but a lukewarm bath is just right, since it neither chills nor weakens me, and I feel well after taking it."

Bathers who take warm or hot baths should be very careful not to stay in the bath, under any circumstances, so long that it makes them feel faint; because too much energy is wasted in the production and elimination of heat, and this, after exercising, will result in having a depressing influence upon the bather.

Persons when taking a bath should always bear in mind that there is great danger of overdoing it.

Baths have been classified according to the temperature of the water. The cold bath is below 60 degrees. The most common temperature of water in which all persons bathe, ranges from 60 to 72 degrees, and is spoken of as the ordinary bath, because it suits most individuals who are fond of bathing. To some, any temperature below 66 degrees or 68 degrees seems very cold, hence the different terms of cold, hot, and lukewarm are purely relative. The temperature of a lukewarm bath will range between 80 and 90 degrees, while the moderately warm bath ranges from 90 to 100 degrees; above this temperature it is called a hot bath,

ranging from 100 to 110 degrees, the thermometer used in every instance being that of Fahrenheit.

Medicated waters, and waters ranging in temperature from cold to hot, are very frequently used locally. Special attention is given to their local application in the chapter on the treatment of strains, sprains, bruises and stiffness. Hot and cold water are sometimes used alternately, and frequently shower or needle baths are so arranged as to be fed by both a cold and hot supply of water, the temperature of which may be regulated.

A shower bath should be used with a great deal of discretion, and none but robust persons should indulge in a cold shower.

A needle bath, which is nothing more than a modified shower bath, may be used in the same manner that one would use the ordinary shower.

A steam bath is made by causing the water to become vaporized. The bather may either go into a steam room or may sit in a closed compartment, with every part of his body protected except his head. This is an excellent bath to relieve one of stiffness, but is quite enervating, especially when continued daily; and I would give especial warning to men who train for athletic contests, no matter whether it be for track athletics, football, basketball, or bicycling, to be very careful lest they overdo the matter. The steam bath does a great deal of good when one first begins to train, but after a week or two, when all soreness and stiffness

has disappeared, it is apt to be productive of more harm than good, and I would advise the discontinuance of it. If stiffness or soreness returns any time after having discontinued the steam or hot-water bath, it will do no harm to indulge in such a bath occasionally. It is not wise to take a steam bath the day before a contest, because energy is wasted in the production of heat. Should a decided reaction be desired, after taking a steam bath, the bather may take a cold bath, consisting of a sponge, a shower, or a plunge, according to circumstances, being thoroughly rubbed immediately after.

A Turkish bath really consists of a series of baths accompanied by a thorough treatment of rubbing. The bather wraps a small sheet about him, which extends from the lower part of his abdomen to the upper part of his thighs. After taking a drink of cold water in order to stimulate his skin and thus start the functions by which perspiration is produced, he enters the warm-room, where the temperature is about 140 degrees Fahrenheit. In this room there are chairs in which one may recline for a time, the time being regulated by the desire of the bather. After this the hot-room, in which the temperature ranges from 165 to 170 degrees Fahrenheit, is entered; the bather remains here a few minutes. Thereafter he goes to the reclining-table, where an attendant applies soap over every portion of his body, after which the treatment of *massage* is applied; this having been done he is thoroughly washed with warm water, which may be reduced in temperature to suit the

individual. The next step is to enter the steam-room and lie down on a wooden bench, in order to take a steam bath ; this having been done the bather comes out of the steam-room and goes into the needle bath, first using warm water and afterward gradually lowering the temperature to cold, in order to avoid too great a shock. Having finished the needle bath, the swimming bath is next entered, the temperature of this ranging from 68 to 72 degrees Fahrenheit. As soon as the bather emerges from the swimming bath, an attendant dries his body thoroughly and wraps him in a sheet ; then he is conducted to the reclining-room, where he lies down upon a couch, after which he is covered with a blanket or two, and remains there for an hour or two, taking a nap if desired. Should he feel the want of a slight stimulant, the attendant brings him a glass of wine or a cup of tea or coffee and a few crackers.

There are some dangers to be guarded against in taking a Turkish bath. No bather should drink an excess of cold water before entering the warm-room ; a glass should be sufficient, and in a great many cases a half a glass will answer the purpose. It is dangerous to stay either in the warm-room or hot-room too long, and will prove injurious by causing a great deal of exhaustion. The moment a bather begins to feel weak he should leave these rooms, even if he has been in them but a minute or two. Persons who indulge in Turkish baths should not allow the attendant to rub them so hard that it causes soreness, nor should

the rubbing be too prolonged. Too long a time should not be spent in the steam-room. After coming from the steam room and entering the needle bath it is dangerous to make the temperature of the needle bath as cold as possible at first, because the shock is too great. No stimulant should be taken unless absolutely necessary. Persons who are of weak and nervous constitutions should omit the swimming bath, because the water as a rule is too cold for them. While in Germany I frequently took Turkish baths, and in addition to the things I have mentioned there was a warm swimming bath. This was the first part of the Turkish bath, and was used to start the process of perspiration.

Medicated baths are made by adding medicinal substances to water. The substances used are sulphur, iodine, bromine, carbonate of soda, borax, carbonate of potash, hydrochloric acid, nitric and nitro-muriatic acid. From a drachm to six ounces of these drugs has been used. To twenty gallons of water may be added from three to five ounces of soda or potash in the form mentioned above. If borax be used, four ounces will suffice. Should the acids I have mentioned be called for, an ounce will answer the purpose. Iodine and bromine may be used in half-ounce quantities to twenty gallons of water. Sulphur may be used in quantities varying from two to six ounces to twenty gallons of water.

There are many cities both in America and Europe where different kinds of mineral baths may be found.

Badenweiler, in the Black Forest, in Southern Germany, is noted for its mineral baths; also Wildbad, in the same mountains; Kissingen, in Bavaria; Aix-les-Bains, in Savoy; Aix-la-Chapelle, in Rhenish Prussia. Here the water is impregnated with sulphuretted hydrogen. Other bathing waters that I have mentioned in reference to the different places contain sulphur, carbonic acid, sulphate of soda, etc. In America we find sulphur baths at Berkeley Springs, West Virginia. At Saratoga, New York, there are springs containing all sorts of mineral waters, which are used for bathing purposes. Colorado Springs has long been noted for its mineral waters, which are not only used for drinking purposes, but also for bathing purposes. There are many other places noted for bathing, both in Europe and America, that I have not mentioned; but nearly all will be found to contain one or more of the mineral salts, e. g., Carlsbad, in Austria.

In concluding this chapter it may be well to throw out a few general hints. Bathing, no matter whether the bather takes a cold bath, a warm bath, a steam bath, etc., always produces greater combustion in the body, and therefore increases the respiratory functions, the action of the heart, the amount of tissue change, and the velocity of the blood current. From the foregoing physiological facts it follows that no one should take a bath who is exhausted.

Rooms in which baths are taken should always be well ventilated, in order that the bather may take fresh,

pure air into his lungs. Should the room be poorly ventilated and foul air breathed, the bath will lose many of its good effects.

Never take a bath when a current of cold air is blowing upon you, so that a draught is the result. The air blowing upon your skin will chill the surface and drive the blood to the internal organs too quickly, thus congesting them, and the result may be a cold the next day. After bathing, always rub your skin until it becomes thoroughly dry, and then bring the surface to a glow either with a coarse towel, flesh brushes, an india-rubber brush or the dry hand. Friction by means of the hands is a great aid to bathing. It not only does good from the rubbing, but also from the amount of exercise one is necessitated to take and the heat produced. Never rub too long, lest you become tired, and thus exhaust yourself, after bathing. Under no circumstances should a person take a bath immediately after eating a meal, because digestion will be greatly interfered with. It is far better to allow three or four hours to elapse before bathing, in order to get the full benefit of a bath and to allow sufficient time for digestion. Always be careful to avoid a chill or shock. These are produced by carelessness on the part of the bather as a rule. There are cases, however, of chill and shock which are due to diseases of various kinds, or ill-advice which has been given by some kind friend or ignorant person.

CHAPTER IV.

RUBBING.

I HAVE intentionally avoided making exclusive use of the word *massage* because I do not wish to burden those who read this chapter with a great many technical terms used in books upon the treatment of massage, and I shall deal with this subject in such a way that it can be understood by any one. Every person who rubs his own body or has an attendant to do it for him, should remember there are two very important points to be considered : first, that the blood in the veins should be assisted back to the heart in order to relieve the different parts of the body which have been exercised, and are congested ; and secondly, to relieve the pain caused in any tissue due to any cause whatsoever. Rubbing may be either local or general, that is, it may be applied to an arm, the back, or the foot, or it may be applied to the whole body. The amount, duration and rapidity must necessarily vary with each individual, because no two athletes are constituted exactly alike. The greatest care and accuracy should be taken in prescribing the quality and quantity of rubbing. A disregard for this will frequently do the person rubbed

more harm than good. I have seen many persons who take exercise regularly, and many athletes, suffer from the unskilled rubbing of an ignorant attendant, the trouble resulting in the skin being rubbed so hard that it left a raw surface. Again, the rubbing lasted so long that great fatigue resulted. Further, too rapid rubbing will frequently cause pain by heating the skin too quickly, causing the hairs of the body to stick to the attendant's hands, giving as a final result a pulling of these hairs. Rubbing should never be begun strenuously at the outset; but should be started slowly and gently, and gradually increased, so as to be adjusted to the individual's feelings. Persons who take general exercise should also take a rub after having taken a bath. In this way they will not only cause the blood to circulate freely again through all parts of their body, but will also prevent or overcome any soreness or stiffness that may be present; and in addition to this the tissues of their body will constantly be kept in a better condition.

Especial care should be given not only to the whole muscular system after exercise, but also to the different joints throughout the body. It is especially important that these be well cared for, in order to avoid the predisposition to different injuries which sometimes occur to athletes when exercising. The person who constantly keeps his joints and muscles supple, by exercise and manipulations, need have little or no fear as to injuries. It is only when these have been neglected that such misfortune overtakes those who exercise.

Every one who wishes to have a fair knowledge of rubbing, should acquire at least a slight knowledge of the structure of the body as well as of its conformations and contours. Muscles are not to be rubbed in the same manner that one would rub joints; therefore a little knowledge of muscles as well as joints is very essential, so that these may be properly treated by rubbing them when it is necessary.

The amount of benefit received from skillful rubbing cannot be estimated ; but it can be safely asserted that the good resulting therefrom is beyond measure, especially in reference to using it after exercising.

Persons who take exercise for pleasure and pastime may rub their own bodies ; but never under any condition should a person who goes into strict training for a contest of any importance rub himself, because in so doing he is wasting a great deal of energy. Moreover, the rubbing must be more thorough, last longer, and be applied to every joint and muscle in his body. For ordinary purposes so much care is not needed. Rubbing sometimes fails to accomplish good results, because it has been wrongly applied ; if, however, it had been properly applied the results derived would have been beneficial. Rubbing is of great service to persons suffering from ruptures of muscular fibres due to exercise, and I have known of several cases among noted athletes that were cured by rubbing, scientifically applied. Rubbing is also of vast importance and great benefit to injured joints, such as water-on-the-knee,

sprained ankles, shoulders, elbows or wrist joints. The amount of rubbing should be regulated carefully by the attendant with a due regard to the effects upon the person being rubbed.

Muscles, when rubbed for an injury, should always be rubbed from their insertions to their origin. Rubbing should, in a general sense, begin from the extremities and extend toward the trunk. This is in order to assist the returning currents of the circulation.

Different kinds of manipulations consist of stroking the body with the palm of the hand; slapping the body with the open hand; beating it with the closed fist; striking it with the hand at right angles to the body, so that the edge corresponding to the side of the little finger comes into contact with it; kneading the skin, muscles and tendons; grabbing the skin and muscles and squeezing them; making combined digital pressure over the surface of the body in different regions. Persons when being rubbed, should request the manipulator to use the fingers and palm of the hand together unless the manipulation be localized and of a special kind, e. g., kneading.

The friction produced by rubbing may be either rectilinear or circular.

One hand or both hands may be used to rub the body. It is customary for the right hand of the manipulator to be used for the right hand and foot of the patient, and the left hand for the left foot and hand of patient, if the rubbing be applied with one hand. Both

hands are used for the back, loins, abdomen and chest. The upward stroke in rubbing should always be more intense than the downward, and the stroke should extend over the whole surface from joint to joint, exercising great care not to chafe the skin. More danger arises in this respect when making the upward stroke than in making the downward.

It is a good rule to commence rubbing in the neighborhood of the large blood vessels so as to influence the circulation as soon as possible, and thus, by sending the blood more quickly to the neighboring tributaries, influence them and the tissue surrounding them. The inner sides of the upper and lower extremities are where the large blood vessels will be found. When rubbing, if one begins with the lower extremities the foot should be well rubbed, then the ankle joint, then the leg, after that the knee joint, then the thigh and lastly the hip joint. The rubbing of the upper extremities should begin with the hand, then the wrist joint should be cared for, after that the fore-arm, next the elbow joint, then the arm, and lastly the shoulder joint. The reason for doing this is to influence the venous blood at the points most remote from the heart and gradually work toward the heart. The chest should be rubbed from the insertion of the large muscles upon it to their origin, while the abdominal muscles should be rubbed from the right groin, as it is commonly called, in the direction of that part of the intestines known as the ascending, transverse and descending colon. When

rubbing the abdomen, the fingers of the manipulator should be kept close together, since if they are separated there will be an unpleasantness about the friction which is very annoying to the person being rubbed. More pressure and less care are necessary in rubbing the back, because the skin and muscles are thicker and more numerous in this region, and the muscles are much larger and stronger. Here as in the abdomen the rubbing should be from the origin to the insertion of the muscles. In the upper part of the back the anatomy of the muscles is so very complicated that it is difficult to understand how to do this unless one has studied the anatomical relation of the origin and insertion of these muscles very thoroughly. As a general method of rubbing the back, I would advise those who wish to have all of the muscles in this region well cared for, first, to rub upward and downward, then cross-wise, and lastly obliquely upward and downward. This will suffice for ordinary purposes and will be of great benefit to those who employ it. The upper and lower extremities may also be rubbed upward and downward. The advantages of ordinary rubbing should never be despised, nor should they be criticised too severely by those who go into the subject of *massage* deeply. Persons who take exercise do not have enough time after exercising to take a thorough treatment of massage, and hence ordinary rubbing must be resorted to.

A rotary movement may be combined with an upward and downward, when one is being rubbed,

and this often relieves one of the severest kind of stiffness.

When rubbing the upper and lower extremities, it matters not which are rubbed first, nor does it make any difference which part is rubbed first, *i. e.*, the anterior, posterior or lateral.

Variety of manipulations may be combined when rubbing any part of the body. Rubbing may be alternated with pinchings, beatings, and kneadings; and frequently from one or more of these combinations more good results than if rubbing alone had been employed. Rubbing not only benefits the muscles but the blood vessels, nerves, and skin; and in addition to this, the different glands throughout the body are benefited because the circulation of the blood is made more active as it passes through them. Rubbing has a soothing effect on the irritability of muscular tissue, and acts as a sedative and tonic to the nervous system. Any one who has been well rubbed after exercising knows how delightful the effects of it were on the whole body, and especially on the nerves and muscles. Rubbing after exercising produces such a reaction throughout the whole body that it is almost impossible to take cold if ordinary precaution be taken. It is also one of the best means at our disposal for increasing the heat of the body.

There are a great many persons who take exercise and rub their muscles only. This is a mistake, because the joints should receive as much care, if not more than

the muscles, since their blood supply is not so good as that of muscular tissue, and hence it is much more important to keep the joints well supplied with blood, and supple by rubbing them. Some of my readers may think I am speaking more especially of the larger joints such as the hip, knee, ankle, wrist, elbow and shoulder; but I would impress all athletes that as much attention should be given to the smaller joints, such as those of the fingers and toes, as to the larger ones.

The face should be rubbed with just as much care as other parts of the body.

This brief consideration of rubbing is intended to give to those who exercise for pleasure or health, as well as those who train for athletic contests, sufficient knowledge to enable them to care for the different tissues in their body after exercising, and in no way is meant to treat of the subject of massage, in detail. Should those who read this chapter desire a more thorough and scientific knowledge of massage they are referred to books which treat of it alone. My intention is to convey to those who desire it, a limited amount of knowledge upon the subject of rubbing, which everyone who exercises should possess; and to impress those who exercise and train for athletic contests, I shall repeat a few important points that are well worth remembering, owing to the unlimited amount of good they will bestow upon those who possess them. Never rub yourself nor be rubbed too long. Do not rub too hard, nor be rubbed too hard. Always give yourself or

have your attendant give you a thorough and general rub. If rubbing be uscd to relieve stiffness do not rub too hard nor be rubbed too hard at first; but gradually increase the pressure and friction, or have your attendant do so. Lie down for ten, twenty, or thirty minutes after being rubbed, if the exercise taken has been violent. Under no circumstances should rubbing be so severe that it produces fatigue. Should one become fatigued after being rubbed, and the fatigue last for a long time, then omit the daily rub for three, four, five days, or longer, as the case may need. Always rub all parts of the body until the body as a whole has a fair degree of warmth and reaction. This can easily be recognized by the general feelings of the individual, and by touching any part of one's body with the hand, when a sensation of warmth will be imparted to it. The skin will also be in a glow and present a bright red appearancc, if the proper reaction has taken place. I may add, before concluding this chapter, that rubbing does an unlimited amount of good to thc skin, and when one's skin has been well rubbed, the glands therein are so stimulated that they excrete materials which if retaincd are injurious to health. In addition to this, the false skin, or dead skin, as it is commonly called, is rubbed off, and is replaced by new, which is of benefit to those who have taken exercise and been rubbed.

CHAPTER V.

DIET.

DIET is one of the most important factors in considering bodily hygiene that one can deal with, because all bodily vitality is primarily regulated by the food we eat. We all know what slaves people are to their appetites, and the nervous diseases that are directly traceable to an overfed body. There are several factors to consider when discussing the kind and quantity of food eaten : its digestibility, the amount of physical energy to be expended in mastication, the chemical elements, idiosyncrasies of each person, etc.

Foods, in books upon physiology, are classified under three heads : substances called proteids, carbohydrates, and hydro-carbons. The first of these in chemical composition contains the elements carbon, hydrogen, oxygen and nitrogen ; the second class contains carbon, hydrogen and oxygen, while the third class is composed of carbon and hydrogen exclusively.

Proteids or substances containing nitrogen are the best foods, because nitrogen imparts energy to the body by strengthening bodily tissue. Examples of proteids are eggs, meats, peas, beans, etc. Carbo-hydrates act as oxidizing agents, and therefore contribute to

the heat of the body. The great mass of carbo-hydrates is found in all foods which come under the head of sugars and starches. Hydro-carbons or those foods which form the third class, also act as oxidizing agents, but do not impart energy to the body in the same manner as proteids. Fat is a good example of a hydro-carbon. It is by keeping a proper balance between these three classes of foods that the best results are obtained. An excess of any one class has a bad influence upon digestion when carried beyond certain limits. Persons who endeavor to live exclusively upon a meat diet do not thrive so well as those who mix with it a diet consisting of carbo-hydrates and hydro-carbons. All persons who are very fond of sugar and starches, are burdened with fat, and have very little muscular stamina; they easily become fatigued and their ~~lung~~ power is very poor, because the fat contained in their tissues readily oxidizes when exercise is taken. Persons who are fat can by a regulation of their diet in conjunction with exercise soon rid themselves of this incumbrance. More harm is done by overeating than by undereating, and those who use a little judgment in eating never know what it is to suffer with dyspepsia, flatulence, itching of their skin, grub-worms, as they are vulgarly called, etc.

The American nation allows far too small a period for each meal, and this is the prime cause, in the great majority of cases, of the many digestive troubles that are to be found among the people who suffer. The

most easily digested foods are liquids, next semi-liquids, and lastly solids. The best food known for general purposes and one that will answer in the great majority of cases is milk. Some persons cannot drink milk, however, and this should always be borne in mind. Frequently it may be made very palatable by adding a teaspoonful or two of lime water to each glass, or a little stimulant such as brandy, whiskey, sherry or port. It is not my intention in this short chapter to deal with the scientific explanations of foods and their relative value. Books on physiology contain very exhaustive chapters in this respect, and for those who wish to go into details in regard to foods I would advise the study of the physiology of digestion. The stomach is the chief organ for digestion, and foods undergo change there, producing heat and motion; therefore the prime object in selecting foods is to take only those that require a small expenditure of energy in their oxidation and that will impart strength to the bodily tissues.

The albuminous foods are the only ones that contain nitrogen, and since nitrogen is found throughout the body in every tissue manifesting energy, albuminous substances are of prime importance. It is not good to eat a superabundance of albuminous food, however, because the time required for digesting and assimilating it will be too great, and in addition to this too much work will be required of the kidneys in eliminating waste matter. The second class is not thoroughly understood, yet it is known that this class is

converted into fat in the body and thus finally acts as fat. In the third class of foods, *i. e.*, fats, carbon is the essential element in the food. Wherever fat is found in the body there we find carbon, and fat is very necessary for the nutrition and growth of tissues. Poor health always follows if one's body does not contain a small amount of fat, and when great fatigue has been encountered it is absolutely necessary to add foods containing fatty matters to the diet.

Another class, which embraces inorganic substances, such as water, common salt and the phosphate of lime found in bread, milk and meat, is required for the co-operation of the chemical processes taking place in the body, and also for the influence they have upon secretion and nutrition. The mineral constituents in them impart strength and hardness to bone, firmness to muscle, and bring about chemical changes in the tissues throughout the body. Common salt exercises a great influence upon the growth and development of the body. All persons know how palatable a little salt makes a great many articles of food, and nature craves for this when it is deficient. The phosphate of lime in the food we eat imparts strength to our bones, and is very important in considering articles of diet. There are additional articles of food that should be considered in one's diet. These are coffee, cocoa, tea, alcohol, extract of beef, etc. These substances have little real force value, but act as force regulators, and in this way exert a great influence upon nutrition.

There are several processes to consider in reference to foods before they are taken up by the blood for the repair of bodily tissue. Each particle of food when properly digested has been changed from an insoluble to a soluble substance, this being accomplished partly by the action of the teeth, stomach and intestines. Foods are also rendered soluble by the action of glandular secretions upon them, such as the salivary, gastric, pancreatic and intestinal. The juice of the stomach has the power of converting the albumen contained in meats, which is insoluble, into soluble substances. The salivary and pancreatic fluids possess the power of converting the starch contained in sago, macaroni, potatoes, rice, and hominy into sugar. In addition to the action of these juices, we find that fat, an insoluble substance, is made soluble by the action of the bile from the liver. A point well worth remembering in regard to diet is to reduce the mechanical labor, which may be done by having foods properly cooked. No process of cooking should be employed that increases the mechanical labor of digesting the food, such as frying, excessive baking, or thorough roasting and the like. These deprive foods of a great deal of their nutrition, for example the juice of meats.

Overwork, fatigue, and excitement, should never accompany digestion, because the food will be incompletely broken up in the digestive canal and a malassimilation will result. On the other hand, cheerfulness will aid digestion considerably.

Care should be exerted in selecting the quantity of the different kinds of foods, so as to obtain a proper amount of all classes, in order that the work of digestion may be distributed evenly to the different organs, and in this way avoid any possibility of giving too much work to any one organ, thus escaping the danger of overworking it. Books on physiology and hygiene give tables stating the exact quantity of each food to be eaten, in grains, and the amount of energy derived therefrom: for reference, see Foster's, Kirk's or Yeo's Physiology and Parke's Practical Hygiene.

No fixed standard can be laid down for all athletes as to the quantity of food to be eaten, because the digestive powers of individuals vary greatly. No food should be overdone or underdone, because both will be indigestible. Meats are more easily digested when either roasted or broiled; if roasted the juice should always be saved. Meats may be eaten rare, and this form is especially needed when a person is in training. Beefsteak, roast beef, roast mutton and mutton chops are the kinds of meat to eat, because they contain more nitrogen than veal, ham and pork. These latter three are to be omitted during training. Fowl may also be eaten, since their meat contains nearly as much nitrogen as the meats recommended before. The variety of fowl may include chickens, turkeys, guinea-hens and ducks. Any of these may be substituted for mutton chops, roast mutton, roast beef or beefsteak, and all are very essential when there is need of change.

Potatoes are useful in small quantities, because they contain vegetable salts which serve to keep the body in a state of health. They also contain a great amount of starch, which is converted into sugar during mastication, by the salivary juice, and are beneficial owing to this fact. If a great many potatoes, however, are eaten, flatulence is likely to be the result. From one to two potatoes of ordinary size, nicely baked, per meal, should be enough for any person in training.

Eggs are one of the most useful and nutritious foods found among the articles of diet for training. These may be either soft-boiled or dropped into hot water. They may also enter into the composition of light puddings. Sugar may be allowed in minute quantities for sweetening tea, and plain puddings. Great care should be exercised in the use of sugar, and in some cases it is best to omit it altogether from the list of articles of diet.

Butter may also be allowed in small quantities, and should an individual find that his digestion is one that craves for butter he may be allowed to eat a moderate amount. If butter be poorly digested, then omit it. It is a common belief among trainers that butter should not be allowed under any pretence ; but if they understood how the fat in butter produced force, when undergoing oxidation, they would readily change their belief. When butter or any substance containing fat is not assimilated readily, oatmeal may be substituted. There are many foods that may be added to the list of vegetables one may be allowed to eat during

training: these are celery, watercress, lettuce, spinach, cauliflower, tomatoes, and peas. Fruits, such as apples, prunes, pears, oranges and plums, may also be eaten. I may add that during the eight years I trained for track athletics I was accustomed to eating a banana for my luncheon every day, and I never experienced any but good results. This I attribute to my great fondness for the fruit and my excellent digestion. To be on the safe side I made it a rule never to eat a banana at the luncheon just prior to my race, but I have frequently eaten one the day before. In some of my trials, although I had eaten a banana but three or four hours before, I ran a trifle faster than I ran my race.

Bread may be eaten freely, but should be a trifle old, say from one to three days. It may be eaten dry or in the form of toast with butter. If the toast be buttered, a small quantity of butter should be used. Never eat hot bread, rolls or biscuit. Crackers may be substituted for bread if desired. Soda biscuits containing a small quantity of salt are very useful. Calf's-foot jelly is a good food for training when used in proper amounts. Sweet crackers should not be used. Green peas may be eaten in moderate quantities, as well as lima beans. These contain a goodly amount of nitrogen, and are therefore very useful as articles of diet. Rice may be eaten occasionally, but not in large quantities, since it contains no nitrogen, and therefore does not impart a great amount of energy to the body, simply acting as an oxidizing agent.

All sorts of theories have been advocated in reference to the amount of water to drink during training and exercise. The best rule for each individual to go by is to take a sufficient amount to quench his thirst, remembering never to be excessive simply from habit. Ordinarily from four to six pints of fluids during the twenty-four hours will be sufficient. Some of this is contained in the foods eaten, such as tea, milk, ale and water. Fluids should not be taken just prior to exercise. Only a very small amount of water, from a half to one glass, of ordinary size, should be taken just before meals, and if possible no fluids except tea and ale or wine should be taken during meals. A little ale or warm tea taken just before indulging in solid food will start and aid digestion. Opinions differ as to the use of alcohol, and I may say that from my own experience of ten years I could not detect any greater benefit during training when I used ale than when I did not, and I was very careful to study the effects of training with and without the use of a stimulant. A small amount of alcohol has little effect upon the system, but moderate and large quantities diminish the power the muscles possess of sustaining their work. Beer may be used occasionally instead of ale, but the quantity should not exceed one pint per day. Beer contains sugar, and may cause the generation of wind, and thus do more harm than good. This fact one should never lose sight of when training. If one becomes *stale* when training, a little wine will

serve to strengthen the appetite. Port, sherry, madeira, or sauterne may be used, diluting it with sufficient water to make it palatable, if necessary. If any of these be taken in large quantities, too sudden a checking of tissue waste is liable to be the result. Tea is used as a nerve stimulant, and may be taken, but should always be weak. It may be taken cold or warm, but better results follow when taken warm. Coffee should not be used by men while in training, unless the deprivation of it causes too great a mental turbulence, because it is too much of a nerve stimulant, and men are prone to drink it in an over-concentrated form.

Foods that may be eaten with moderation when the training diet has become monotonous are ice cream, plain cake, such as sponge cake, floating island, etc. Discretion should be used in the selection of these, and they should not be eaten shortly before a contest. They may be eaten after a contest, but should not form a part of the regular diet. Other articles of food that have not been mentioned should not be eaten in training, except when one is a trifle stale, under which circumstances a change is the very thing needed. Desserts that may be included in the training diet are: bread, rice and tapioca puddings, cup custard, sponge custard occasionally, and apple-tapioca.

With the list of meats, vegetables and desserts mentioned in this chapter, no athlete should have any trouble in selecting a sufficient variety for each meal, nor should his training diet grow monotonous.

The chief substances for the athlete should be meat, eggs and bread, while the vegetables, stimulants and desserts should be considered as necessary accessories. All meats should be eaten at regular intervals, always allowing from five to six hours after each meal, remembering to make it the rule never to eat between meals. The one exception is, if necessary, to allow the athlete to eat a little food about an hour after a very severe contest, e. g., a chicken sandwich, a piece of dry bread or toast with a very little butter on it, or a sandwich made from cold roast beef, in order to re-establish quickly the destruction of tissue which has been caused by exercise.

CHAPTER VI

SLEEP.

SLEEP is also one of the most important factors to be considered by athletes while in training, or by those who take exercise for recreation and health, but who do not care to attain the high degree of physical endurance and strength reached by the athlete. The exact amount of sleep for each individual varies; the best way to be guided, as to the number of hours to be allotted to sleep, is to let nature adjust the period of repose. Some persons thrive on six or seven hours, while others need eight, and in some cases nine or ten is required. Young men under twenty or twenty-one years of age usually require more sleep than persons who are older. This is because growth and development are greater before the twenty-first year than after it. It is an old saying that an hour's sleep before midnight is better than two or three after, and no one who goes into training for any contest should retire later than half-past ten. Sleep is the most perfect form of bodily repose, and is the time during which the body has the most available opportunity to reconstruct the different tissues throughout the human machine. It is

well to cultivate the habit of going to bed regularly; a variance of even ten or fifteen minutes every night will make considerable difference in the body's memory, and from this variance the effects upon the different systems in the body, such as the nervous, circulatory, muscular and glandular, will be markedly felt.

Persons who exercise regularly or train should make an especial effort to have the rooms in which they sleep at a distance from all disturbing influences, such as street cars, railroads, machine shops and boiler works. It is true that persons become accustomed to the foregoing; but the vibrations produced upon the body by these influences make themselves felt even when one is asleep, and sleep is not so sound as it would be if these influences were removed or avoided. Persons who enjoy a sound sleep receive twice as much benefit as those whose sleep is light or disturbed. No one who tries will fail to go to sleep shortly after getting into bed. It may take a few weeks to cultivate this habit, but it will surely come if the individual be persistent in his desire. Immediately after retiring one should endeavor to cease thinking until the next morning. This will aid in reducing the expenditure of bodily energy, and will give the brain and other bodily tissues an extra amount of rest.

The best position to be in when asleep is upon the right side; this is owing to the fact that the heart performs its work more easily when one assumes this position. The position of sleeping upon the right side

should not be cultivated by persons who have always been accustomed to sleep upon their back, left side, or stomach, because they will find their sleep disturbed, owing to the change of position, or they will not be able to sleep at all.

The head should not be covered during sleep; not only does the covering interfere with respiration, but it also predisposes the sleeper to cold when the covering is removed; and this may happen any time during the period of sleep. Moreover, one is liable to breathe air that is more impure than when the head is free from any covering. In cold weather the bedclothing should be drawn well up about the shoulders and tucked in closely, in order to retain the heat of the body. Care should be exerted in regard to the kind and amount of bedclothing. Too much covering does harm by its weight, because the body is compelled to support it, and, in so doing, expends an unnecessary amount of energy. Muslin sheets to sleep between, with woolen blankets both above and below the sheets, afford a very good and comfortable means of protecting the body. Little or no covering is necessary in summer. The bed should be moderately hard, and in many instances it will be found that a man prefers a very hard bed.

The temperature of the sleeping-room should be about sixty degrees Fahrenheit during fall and winter weather. This may vary a few degrees either above or below sixty degrees, according to the peculiarities of the individual. The temperature of the sleeping-room will

regulate itself during summer, yet the room should not be directly under a hot roof. Many persons who train and who have been accustomed to sleep in a temperature of sixty-six degrees, sixty-eight degrees, or even seventy degrees Fahrenheit, think that they could not possibly go to sleep in a room with a temperature of sixty or sixty-two degrees. By a little practice, and gradually reducing the temperature of their bedroom, they can soon teach themselves to go to sleep and sleep soundly. After a couple of weeks, or a month at most, they will find a marked improvement in their general condition. They will be relieved of troubles, such as headache, dry throat, lack of relish for their food, and slight nervousness, which disappears shortly after arising, that are directly traceable to contaminations found in an atmosphere of sixty-eight or seventy degrees, of a poorly ventilated sleeping-room.

Under no circumstances should two persons sleep together when in training; they may sleep in the same room, but always in different beds; and it would be better if but one person slept in a room. Should it so happen that two or more persons, while in training, are compelled to sleep in the same room, the greatest care should be exerted by the trainer in selecting the men, so as to put persons together who are perfectly congenial. If there is not a friendly feeling between them the mental discord, although it may be overlooked by the trainer, will frequently be the cause of one or more men *training off*. Mental tranquillity has a most

powerful influence on the sleep of men who train, and many a man loses a great deal of sleep simply because his coach or trainer is continually finding fault with him. This fault-finding of the trainer not only makes itself felt on the brain of the person being trained, but also on the whole nervous system. It also, by affecting the nervous system, modifies the co-ordination of muscular movement, since all the muscles in the body are controlled by a nervous mechanism coming either from the brain or spinal cord. In addition to the influence upon the muscular system, the lungs and heart become affected, and marked chemical changes take place in other organs, which greatly influence sleep, and, in some cases, result in making the heart impulses irregular. This irregularity is frequently found among athletes, and is a very common cause of sleeplessness, being only overcome when the nervous system is relieved of the exciting cause which produces an alteration in nervous impulses.

All persons should breathe through their nostrils when asleep, for two reasons: first, all particles of suspended matter found in the air will collect in the nostrils and thus be prevented from entering the lungs, and secondly, the temperature of the air will be changed more gradually than if the air be breathed through the mouth. The individual will also avoid the extreme dryness of the throat which results from sleeping with one's mouth open. Few trainers realize that one of the most frequent causes of staleness is sleeplessness brought

about by mental anxiety which is due to severe criticisms. Other causes of sleeplessness which lead to staleness are overwork, sewer gas resulting from bad drainage of the training quarters, impairment of digestion resulting from food such as meat that is slightly tainted, bad ventilation, poor water and milk. These causes of sleeplessness are often overlooked by trainers, and are sometimes discovered when it is too late for the competitor to regain his much-needed vigor and snap before the contest for which he is entered.

Another cause of sleeplessness is being irregular about going to bed. Many men train for a contest of one sort or another, and never retire at the same hour, for two consecutive nights, during the whole time they are training. Is it any wonder the brain cannot get accustomed to a definite time, at which a desire for sleep should begin to manifest itself? Moreover, when the habit of retiring irregularly every night has once been acquired it is a difficult matter to form a regular habit. In order to accustom the body to a regular time at which it may look for sleep I would advise those who have been in the habit of retiring irregularly when not training, to begin to retire at a fixed hour, say ten o'clock, about a month before going into strict training. By so doing, the difficulty of being unable to go to sleep immediately upon retiring will be overcome unless the bad habit of sleeping an extra hour or two in the morning is indulged in; under which circumstances it is hard to get to sleep shortly after retiring. If the

man by his will-power goes to bed promptly at half past ten and arises not later than six, six thirty, or seven, he will be able to sleep during the whole night, without fear of waking, since his body, when he is in strict training, will need at least this amount of perfect repose. Men frequently spoil their nocturnal sleep by taking a nap after their dinner, sleeping from one to two hours; and this very frequently is the reason they do not enjoy a thorough rest during the night, which is the proper time for sleeping. When in good condition there is no need for sleep during the daytime. The sleepy tendency which manifests itself during the daytime is usually traceable to an excessive abundance of food being eaten at mealtime or to overwork. If due to the former, the trainer should see that such a fault shall not occur again; and if due to the latter, the trainer had better advise and insist upon a rest of a few days or a week if necessary, and then the athlete will have no predisposing cause at work producing a constant desire for sleep.

Too much light is a bad thing in a sleeping-room after one has once retired. It not only keeps the room warmer, but in warm weather is the means of attracting insects of all kinds, and bats, and the glare is very annoying to the eyes.

The sleeping-room should be kept perfectly clean; no heavy curtains should decorate the windows, because too much dust will settle in them, and they will prevent the free circulation of air.

Under no circumstances should the sleeping-room communicate with the bath-room and water-closet, because the drainage, no matter how perfect, will always be a predisposing cause of trouble, and odors from the drainage pipes will pass into the sleeping apartment even when the door between the two rooms is closed. The chamber should not be kept in the sleeping-room; in fact, it should never be seen there during any time. Urine readily decomposes, and the odor from it is not only annoying but positively noxious. If there be a stationary wash-stand in the room it should be scrubbed thoroughly once a day so as to avoid the accumulation of dirt about its sides, and the soap-dish should be as clean as the wash-stand.

Dirty towels, such as I have seen in more than one training quarter, should never be seen, nor should dirty clothes be allowed to be kept in the room. With the above precautions the air of the room will be pure, and there will be no accumulation of dust, dirt, foul air, impurities, and germs. The room should also receive sunlight during some part of the day.

There are a great many disorders arising from disturbed sleep, and many of them are of such severity that the care and advice of a physician are needed. Insomnia too frequently is the result of abusing the body by depriving it of the sleep it needs by staying up until early in the morning. Dyspepsia also results from an insufficient amount of sleep. Not only does more blood go to the brain when one is awake, but this extra

amount of blood diminishes the normal amount of blood supply going to the digestive organs, and hence we find dyspepsia occurring. The same is true of the many bilious attacks which overtake hundreds of athletes. Constipation also results from overtaxing the body, by allowing too little time for sleep. The bowels need an adequate blood supply just as other organs ; and is it any wonder so many people are constipated when they diminish the blood supply in these organs by drawing it to the brain in order to keep awake ? Again, when there has been too little time allowed for sleep the muscles and nerves suffer greatly, because these tissues do not receive enough blood, during the time allotted to sleep, to allow them to repair themselves completely. The heart and lungs also suffer when too short a period has been allowed for sleep, because more energy is necessary when awake to sustain the functions of respiration and circulation. Further, the tension thrown on the different ligaments and tendons of muscles requires more energy to be expended, because one is sitting, standing or walking when awake, in almost every instance ; while when sleeping, there is no tension thrown upon the body and its component parts, all of the tissue being in a state of relaxation.

These points are well worth remembering when one trains for any athletic contest, and by using a little discretion the athlete can gain sufficient knowledge to guide himself intelligently and avoid many annoyances and discomforts produced by a disregard for sleep.

There is no factor, in considering the matter of training or exercising, which is productive of so much harm in after life as a disregard for sleep, and no athlete can train severely for any contest and do justice to himself who allows too little time for repose. I know there are many men, and good ones, too, who train faithfully so far as exercise and diet are concerned, but who, alas, do not live up to the letter of the law in regard to the proper amount of sleep. All of these men break down sooner or later. I shall have something more to say to these athletes when I come to consider the causes of diseases which are unjustly attributed to training, the true causes being found among the immoral habits which sometimes form part of the athlete's inner nature. The more serious diseases which follow a want of sleep and bodily abuse should receive the immediate treatment of a physician before they are allowed to go too far and ruin the constitution for life

CHAPTER VII.

HABITS.

THE expression "force of habit" is so old that it has become trite; yet when one stops to consider the influence that this force exerts on vitality and bodily function, there is no denying the fact that the consideration of "habit" plays a most important part in reference to training and exercises of all descriptions. The habit of training severely is rarely, if ever, the true cause of injuring the constitutions of so many athletes.

The true causes are found, in a great many instances, among the following: smoking, staying up too late at night, indiscretions in diet, a lack of self-control, moral weakness, alcohol, constipation and profanity.

Tobacco should never be used, excessively, when training for an athletic contest. It sometimes happens that it is absolutely necessary to allow an athlete a moderate quantity of tobacco, in order to avoid the nervous wear and tear which is the outcome of a dissatisfied mind. Often it will be impossible for an athlete to get into condition, if his trainer refuses to allow an occasional smoke. The cause of this is directly traceable to the lack of harmony existing between the different

bodily tissues, produced by the athlete being deprived of tobacco, which, if allowed, would adjust every tissue so that the results would be a perfect co-ordination of all parts of the human motor. Great care should be used in allowing an athlete an occasional smoke or chew, because the habit may be abused, and then more harm will result than good.

Unless the case is an extremely urgent one, the use of tobacco should be discontinued while training. Tobacco exerts a very powerful influence on the body; the active principle, nicotine, is very poisonous, acting as a powerful depressant, and unless the athlete has become accustomed to it, nausea, wretchedness, vomiting, paleness of the skin, cold perspiration and weakness follow. Everyone knows the general effect of tobacco on the heart and digestive organs. It is an old saying, "He has a tobacco heart," or, "Tobacco dyspepsia." These should suffice to warn athletes against its use. Tobacco also acts as a depressant on the spinal cord, and in so doing diminishes the athlete's power of locomotion, since the motor-impulses governing involuntary movements originate in the spinal cord; and even when the movements governing the muscles are reinforced by impulses from the brain, they are also affected because they must pass through the spinal cord before being distributed to the upper and lower extremities, chest or abdomen. Tobacco has a decided influence on the pulse rate, lessening it in a marked degree, and by so doing, interferes with the circulation of the

blood. This effect of tobacco on the blood is sufficient to cause an absolute discontinuance of it during training. There are many additional reasons why tobacco should not be used, but a thorough discussion would occupy too much time and space. Those who desire to study more thoroughly the effects of tobacco on the body can do so by reading the article in Professor H. C. Wood's book on Therapeutics.

The habit of retiring late when training for athletic contests is one that needs severe criticism. The athlete who trains for any contest and does not retire until two, three, or four hours after he should be in bed, is sure to suffer. No man can do this without injuring his constitution. I know men who lost the amateur championship of America and the Inter-Collegiate championship, because they could not refrain from going to a reception a night or two before the day set for the games. The energy expended by the excess of oxidation taking place in the body, caused by losing two or three hours sleep just before each contest, was sufficient to cause defeat. This should always be borne in mind by athletes who wish to succeed, and especially when training for a championship.

Indiscretion in diet causes an excessive expenditure of energy by producing an extra amount of oxidation in the bodily tissues, which is the means of increasing muscular and nervous activity, thus interfering with nutrition. An indiscretion in diet is often sufficient to alter the digestive functions of an individual to such an

extent that his physical condition is changed so that his muscles and nerves fail to respond with the same degree of quickness and accuracy. There is also less energy found in these tissues when the food has caused a marked disturbance. It is far from wise to be indiscreet by changing the habit of eating regularly, especially when training. It is a very easy matter to become irregular, and an occasional indiscretion, which may seem trivial at first, often results in an utter disregard for regular habits of eating. If men in general knew how much energy is required in the process of digestion, there would be fewer indiscretions, and they would cultivate a habit, not only of eating regularly, but also of studying their diet so closely that there would not be the slightest chance of infringing on the digestive powers. If athletes wish to improve greatly they should study their diet, and form a habit whereby no indiscretions are committed. By making it a rule to be particular, it is an easy matter to become habituated to a regular time for eating, and to a proper amount of food. In so doing there is no likelihood of indiscretions occurring.

A lack of self-control plays a most important part in its effects on the body, and when an athlete is well trained physically, nothing upsets his nervous system more quickly than a lack of self-control. The moment an athlete loses control of himself his whole nervous system works so rapidly in distributing impulses to every organ and tissue in the body, that fatigue manifests

itself. In fact, the expenditure of nervous energy which results from a want of self-control is sufficient, in many instances, to allow a second rate athlete who possesses self-control, sufficient advantage to defeat a first-class man.

It is not an easy matter to cultivate the habit of self-control, and owing to this very fact some athletes never become first-class men. There are so many requisites in the power of self-control that it seems a hopeless undertaking for those who try to gain it; but I can assure my readers that, by making it a habit to do something every day which develops this power, they will be surprised in the course of time to find they are gaining the power, and by perseverance will improve greatly, finally mastering themselves.

One of the hardest things to overcome in regard to self-control, is a moral weakness of any description; yet the man who knows he is morally weak and who daily does something which will form a habit whereby he strengthens himself in conduct, will in due time become so strong that his weakness will disappear. Training helps a man to become morally strong, and when a good force of habit is added to training, the result is not only a sound man physically, but also a good man morally.

Many men and athletes are troubled with constipation. This usually results from neglecting to attend to the bowels regularly. The bowels should be evacuated regularly, and it is a very easy matter to acquire

the habit if a definite time is set apart for this purpose. If persons knew the injurious effects which are directly traceable to constipation, they would cultivate a habit whereby the bowels receive proper attention. If a glass of cold water be taken on arising and a regular habit formed the bowels will keep in good order, and the digestion taking place in them will be more thorough. Athletes, as well as others, who suffer from constipation will be greatly benefited by forming a habit that will relieve them of intestinal troubles, if they will pay strict attention to their bowels.

Liquor of any kind, except when allowed in small quantities, is extremely injurious to all men who train for athletic contests. Alcohol, no matter what its form may be, when constantly taken, even in moderate amounts, has a depressing effect on bodily tissues. It ruins the nervous system, as well as making itself felt on the muscles, and the brain is often affected to such an extent that insanity follows. Under no circumstances should alcohol be used in training simply as a beverage. It may be used with caution and discretion for medicinal purposes; that is, as a slight stimulant, as an aid to digestion, and in cases of fainting and exhaustion.

Profanity is another bad habit that interferes with physical as well as mental harmony. When anyone uses oaths it is frequently because the person has been irritated. The impression made on the brain is far from pleasant, and this impression is often transmitted through the whole nervous system to the

muscles, making the effect felt there. Moreover, there results from the impression made by swearing an improper co-ordination of movements which diminishes the speed or accuracy or both of the athlete according to the sport in which he is engaged. The improper co-ordination of movement caused by swearing also tends to alter the respirations and heart-beats, and in this way an athlete who is addicted to the habit becomes winded before he would if he did not use profane language. This last effect is extremely marked in all men when exercising, who become greatly excited. I would not have my readers think for a moment that all athletes swear, because they do not; yet as to those who have acquired the habit, it will readily be seen from the foregoing influence on the body that it is a great gain to an athlete to conquer this habit.

The man who succeeds in the vast majority of cases, if not in every instance, is the one who is particular in every detail as to his habits. He not only lays great stress on each detail, but also masters if necessary every one of the habits I have quoted. The habit of being particular in the minutest details teaches every man to cultivate a force of character which is of great benefit to him, and many athletes by their training acquire such a strong force of habit from the discipline they undergo that they become the noblest of men.

CHAPTER VIII.

FATIGUE.

FATIGUE is a condition caused by exercising the different parts of the body. When a man exercises, he is teaching his body to withstand work. Fatigue may affect a part or all of the body, according to the exercise or exercises indulged in; in the former case it presents local disturbances, while in the latter these become general. When one begins to become fatigued all that is necessary is to make a greater effort of the will in order to make the muscles contract more energetically, and the athlete who has the determination to do this is the one who can push his endurance of fatigue to the greatest degree. It would seem that this is an easy matter, but, when it comes to the practical application of it, few athletes are found who have the necessary *grit*, as it is commonly called, to do so. Moreover, it is a power which can be developed only by patience and practice. Some athletes are born with a great deal of *grit*, and some acquire it by exercise, while there are those who are without it and who never develop it. The last always make third-rate athletes. The cause of local fatigue is due both

to muscular and nervous energy. The muscles become less and less able to work, pain manifests itself, and finally there is an absolute incapability of action. If fatigue be moderate the muscles may be made to move the parts which they control, by making a greater effort of the will. Effort continued will cause the muscular fibres to contract until exhaustion takes place. With men muscles never become absolutely fatigued; will power may not be able to make them contract, but if an electric current be applied, it is found that the muscles are capable of contracting, thus proving that they had not been thoroughly exhausted. No matter how strong the will power may be of an individual, it cannot produce the degree of fatigue in muscles that electricity and other stimuli produce. It is a common expression among athletes to say that a man is exhausted after taking violent exercise, but such is not the case since his muscles could be made to do work if stimulated by electricity. The very fact that will power never produces complete exhaustion, is a safeguard to every one who takes violent exercise. If the will possessed the power to cause complete exhaustion, there would be great danger to every one who exercises violently, because there would be no factor that would regulate the effect upon the different tissues throughout the body.

Fatigue produced in a single group of muscles has more or less effect upon the brain, and disturbances take place in the brain which frequently make themselves

felt to such an extent that the sensation is painful. When fatigue is prolonged, will power begins to diminish ; and this makes itself felt, indirectly, by causing the muscles to act less quickly and energetically. Fatigue also produces pain in muscular tissue by the exercise causing more or less shock to the fibres composing it.

Fatigue of the brain makes itself felt long before the muscle gives out. The cause of this can sometimes be traced to the anxiety and nervousness many athletes experience before entering a contest. This nervous strain is depressing, and is the cause of the defeat of more than one athlete. The nerve centres are affected by voluntary movements, and any one who wishes to avoid the effect of these should endeavor to change a voluntary exercise to an involuntary one, in order to avoid as much nervous fatigue as possible. Not only this nervous fatigue makes itself felt upon the nerves and brain, but it also affects the lungs, heart and kidneys.

An exercise that, when voluntary, causes fatigue, will produce fatigue more slowly, when involuntary.

There is no fixed law to go by in regard to the susceptibility to fatigue. It may be said, however, that the stronger and healthier the constitution, the less quickly will the body become fatigued, while the weaker and more unhealthy the constitution, the more quickly will fatigue come on.

The structures of the body that are chiefly concerned in the study of fatigue are the brain, spinal cord, nerves, muscles, and lungs. The first three compose

the nervous system, and regulate the impulses governing the action of the entire body. It may be safely said that there is no muscular exercise capable of bringing into play all the muscles of the body, which at the same time excludes the action of the lungs; hence general muscular fatigue is always accompanied by the use of the lungs, and in all violent exercises these organs are the chief regulators of the athlete's powers of endurance, being assisted by the heart, which, strictly speaking, belongs to the muscular system, since it is a hollow muscular organ.

An individual may by using different groups of muscles cause them to become fatigued without experiencing any marked difference in the number of respirations per minute; but the lungs, nevertheless, will eliminate enough carbonic acid gas to keep pace with the amount of this substance produced by the muscles, without being greatly affected.

Nervous fatigue makes itself felt more than muscular fatigue, and leaves a greater impression on the individual. If the exercise be a voluntary one, then the brain becomes more active. When an exercise increases in violence the tissues in the body become fatigued more quickly, and if the exercise be very violent it leads to overwork and exhaustion.

Muscular overwork and exhaustion are produced by prolonging an exercise beyond the physiologic limits of endurance, and sometimes result from neglect on the part of the athlete to use good judgment.

It may also be said that the same is equally true of the effects on the nervous system. The athlete who prolongs his exercise with an extra expenditure of nervous energy suffers from fatigue in the same manner that the man does who studies too hard.

The extreme effects of fatigue which lead to overwork and exhaustion are always noticeable in exercises which give a great amount of work to the heart and lungs. Many persons develop the muscles of the whole body, neglecting the lungs; and after this has been accomplished they indulge in a violent exercise which not only demands all the muscular strength they possess, but a strong and well-developed pair of lungs, and having given no especial attention to these they are surprised to find that fatigue overtakes them long before they had anticipated it. More attention should be paid to developing the lungs, because these organs are the chief regulators of the amount of fatigue the athlete will be able to endure; and if these are not well exercised, fatigue will manifest itself very quickly. The lungs may be thoroughly developed by running.

When the lungs and muscles have once been well developed and strengthened, then they should be taught to work in harmony with each other, so that the elimination of carbonic acid gas may keep pace with its production, since it is the substance which is responsible for producing fatigue. The tissues become clogged up with it, and the more violent an exercise is the more quickly will fatigue be brought on. The muscles are

the first to suffer, then the nerves, next the brain, and lastly the lungs. The lungs after a given time are unable to eliminate this poisonous gas, and just as soon as the elimination is less than the production, fatigue begins to make itself felt upon the whole body; and when the exercise is violent and prolonged, it leads tc overwork and finally to exhaustion.

It is never safe to push fatigue to the point of exhaustion unless the body has received the most care-ful preparation for the work, by strict training, and even then it is better to avoid such a condition if possible.

When fatigue begins to manifest itself upon the heart and lungs shortness of breath gradually appears, the respirations being decreased in volume but increased in number, the heart beats grow more frequent and irregular at times, the muscles respond less quickly, the face becomes livid, the veins stand out all over the body, the lips grow blue—quivering at times; and if fatigue be pushed further, small particles pass before the eyes, the brain becomes affected, consciousness is disturbed or lost, and the person sinks to the ground, no longer able to sustain the violence of the exercises. This is an accurate description of extreme fatigue, the final result being that of fainting.

To be able to withstand severe fatigue, for a long period of time, requires not only a strong will, good heart, and well-developed pair of lungs, in addition to a strong muscular system, but also that all of these work in harmony with each other.

The degree of fatigue which causes breathlessness is very great. Breathlessness is due to a passive congestion. In plainer words the veins throughout the body are surcharged with blood containing carbonic acid gas. To increase the power of eliminating this gas requires that the whole of each lung should come into play; therefore it is necessary to develop that part of the pulmonary tissue which is not brought into play during ordinary respiration, namely the tops. Further, by practice the area of the lung cells may be increased, since they are composed of elastic tissue, and this gives the athlete additional power of resisting fatigue. Great attention should be given to these points in considering all exercises which are liable to produce extreme fatigue, since if they be neglected the athlete will lack the very thing he most needs—*staying power*. Practice alone imparts to the athlete the power of resisting fatigue, and exercises which at first are capable of producing great fatigue will have very little effect when proper methods of training are pursued.

The question of how to treat fatigue is of great importance to those who exercise, and especially to those who have weak constitutions or who exercise very violently. The quickest way to overcome any degree of fatigue is to lie down upon the flat of one's back. To assist the body in regaining its normal condition, the knees may be drawn up and the arms elevated. If respiration be labored, endeavor to make exhalation deeper and of a longer period of time, so as to get rid of

the carbonic acid gas. Also, have an attendant rub the arms and legs, beginning at the hands and feet, throughout their whole length, toward the heart. Should unconsciousness be present, then dash a little cold water into the athlete's face, also pour a teaspoonful or two of brandy, sherry or whiskey into the mouth, and slap his hands, feet and face with the open hand. If necessary, repeat the dose of the stimulant and hold a bottle of ammonia to the nostrils. Be careful never to allow an athlete suffering from such a degree of fatigue to lie on damp ground, a damp board or bench, in a draft or by an open window. Should recovery be slow and the respirations and heart-beats weak, send for a physician at once. The power of resisting fatigue varies greatly, and therefore it is a good thing to be able to take care of yourself, and the knowledge of the foregoing treatment will be of great service.

A degree of fatigue that frequently presents itself is that of *becoming winded.* This condition is easily produced when a person has not taken exercise for a long time. That the picture of becoming winded may present itself clearly to my readers, I shall quote the phenomena that take place in a man who runs, walks, wrestles, plays football, or rows, when out of condition. He begins the exercise with all of his old-time vigor, and is surprised at first to find how well he can use his muscles; but in a very short period of time they begin to feel the effects of the work, then slight distress comes on, which soon becomes severe, respira-

tion becomes embarrassed, the chest feels as if something was preventing it from expanding and contracting. As the exercise is continued, distress becomes more and more apparent, the blood circulates faster and faster through the blood vessels, the veins expand, the heart increases the force and rapidity of its beats, the blood vessels about the head and eyes begin to throb, perspiration is profuse, sight is disturbed, the lungs are no longer able to do the extra amount of work required, and the athlete is finally compelled to stop the exercise. When an athlete has once been winded, it is absolutely compulsory to cease the exercise, because the disturbances caused in the different bodily tissues will produce exhaustion, followed by fainting, with a loss of consciousness, if the work be pushed to its limit.

Athletes who run rapidly are compelled, after a given time, to stop in order to get their breath, and I have often heard them say, when in good condition, "My legs are all right, but my wind is poor." This is because they have given too much time to developing their legs by using a form of exercise that calls for little action of the lungs. It would have been far better for these athletes to have given more attention to exercises that call for good, strong and prolonged lung power, and less to those which develop the legs.

The manner of breathing has much to do with the power one possesses of resisting fatigue, and a great deal of attention should be given to this point.

To resist fatigue well requires that an athlete should know how to use the abdominal muscles, so that he may be capable of exhaling thoroughly, in order to rid his lungs of the excess of carbonic acid gas they contain. Many athletes are very deficient in this respect, yet if they paid a little more attention to the proper use of their abdominal muscles, their power of resisting fatigue would be more than doubled. To increase the power of resisting fatigue also requires that the muscles of the chest, back, and loins should be well developed, because these play a large part in separating and bringing the ribs together, more space is afforded for the lungs and heart, and a greater amount of air is inhaled and exhaled. I have seen dozens of athletes who if they had paid more attention to the foregoing would have possessed twice the staying power.

The fatigue produced by becoming winded may last for a long or short period of time, being regulated by the duration of the exercise and the violence of movement. In some exercises the athlete regains his wind very quickly on the cessation of work; however, if the exercise be very violent and prolonged, such as running a mile in five minutes or less, his wind will not regain its normal condition for some time.

The same will also apply to the heart-beats; they will be increased greatly, at times being doubled per minute, and this excess will continue for some time, according to the violence of the exercise. In the year

1886 I ran for the inter-collegiate championship of America in the one-mile run, winning it only by about a foot after the hardest kind of a race. The track was somewhat heavy owing to a rain that fell just previous to starting, making it harder to run in good time. This race was the closest and hardest I had ever run in my whole experience of eight years, and while the time, four minutes, thirty-eight and four-fifths seconds (4 min. 38 4-5 sec.), was not phenomenal, yet my heart-beats were increased to 144 per minute or just twice the normal, so great was the fatigue. This condition continued for some three or four minutes ; then the beats diminished to 110 per minute, a minute or two later they decreased to 96, and at the end of fifteen minutes both my heart-beats and respiration were normal, mamely 72 for the heart and 16 for respiration. In this race my respirations were increased to 44 per minute, but returned to their normal condition about five minutes after I had finished the race. I quote this instance to show that respiration often returns to the normal long before the heart-beats, which demonstrates that fatigue of the heart lasts longer than that of the lungs. It also shows how important, in exercises which call for excessive endurance, it is to have the heart and lungs well prepared by training, in order to avoid any strains or ruptures.

Fatigue never troubles the function of the heart and lungs unless the exercise be a violent one. When one gets winded it is always the result of violent exercise

which calls for a great and prolonged expenditure of force. If any one will simply study the phenomena that cause him to become winded he will find that deficiency in respiratory capacity is the fundamental cause of his becoming short of breath. The only way to increase the power of deferring the time at which breathlessness comes on, is to take exercises which will gradually increase the capacity of the lungs. This may be done by running long distances, or sprinting distances of three or four hundred yards, and by taking from fifty to one hundred deep inhalations and thorough exhalations every morning and evening, also adding to this exercises with chest-weights for the special purpose of developing the muscles about the ribs. Unless a person is diseased or deformed, fatigue will not produce breathlessness until the production of carbonic acid gas in the system has been greatly increased.

The factors that regulate the period at which breathlessness will manifest itself are strength, size and integrity of the heart, condition, size and capacity of lungs, and the aptitude which has been acquired in the use of these organs from practice. To avoid becoming winded it is necessary to regulate the exercise of the muscular system with a great deal of judgment, so that the production of carbonic acid gas may not exceed the eliminating power of the lungs too quickly. Practice alone will give the athlete an instinctive knowledge of how to regulate this, and when it is once acquired, the athlete will find he has an extremely good "wind."

Many athletes who indulge in different kinds of exercise are troubled with what they call a "stitch in the side," which compels them to cease exercising. This is due to a slight muscular spasm, or nervous change, produced by an excessive amount of carbonic acid gas accumulating in a localized part of the body, usually on either side just below the ribs, or just above the right or left groin, and is in the great majority of cases found in men who have not exercised regularly. If it occurs in persons who do exercise regularly, the cause is usually the fact that exercise has been taken too soon after a meal, or that some of the food eaten has not been digested thoroughly. Novices may get rid of this painful condition by making the exercise less prolonged and less violent at first. If the stitch be due to exercising too soon after eating, it is sufficient to allow more time between eating and exercising to avoid the pain. Should the pain be severe, a cloth dipped into hot water, wrung out, and applied over the seat of it will usually give immediate relief. If the pain caused by a stitch in the side be excruciating, and the application of the hot cloth does not relieve it in a few moments, it is best to seek medical advice. Drugs for this purpose should never be prescribed by anyone but an experienced physician.

CHAPTER IX.

OVERWORK (STALENESS).

THIS is a condition that overtakes all athletes who train too long, and, unless guarded against, is productive of serious results, which lead to disease, and in some instances death. Overwork is found frequently among men who train for football, rowing, track athletics, field sports, gymnastic contests, etc.

Many athletes wonder why it is that they are defeated, when on previous occasions they have never had any trouble to vanquish their opponents. The explanation is a very simple one. When an athlete begins to take systematic exercise, or train, for the first time, he gradually subjects his muscles, nerves, and lungs to severe work. These organs acquire an instinctive knowledge of the amount of energy they are required to expend, and as time goes on they begin to feel the effects. The athlete, not recognizing this, either does not allow enough time for these organs to rest, or he increases the severity of his exercise too rapidly. After a short time he finds his muscles, nerves, and lungs do not respond to their work so readily, although he has the desire to continue his

exercise, and he is surprised when he finds he has fallen below his record, never stopping to ask himself the cause. It never occurs to him that his tissues are being overworked, because he is able to make them do a fair amount of work without becoming greatly fatigued. As days pass by he learns there is no improvement in his condition, in fact the muscles do not respond with the same vigor, the nerves do not send such strong impulses to the muscles, and the lungs get choked up before the exercise is half finished. Such is a picture of overwork, which is called by athletes "staleness."

Overwork is a common occurrence among men who train very hard, and it occurs in this way. The first year a man trains he is put through a course of very rigid exercise, the second year the work is still harder, the third year it is marvelous the amount that his tissues will stand, the fourth year he works still harder, only to find that he is unable to do as well as he did in previous years, and he is astonished. He asks himself the question, "Why am I not able to do better?" Because, during the first two or three years the tissues were being trained up to their utmost limit, and being a novice, it took all this time to develop the different tissues to their highest degree. The body, during these years, retains some of its training—is in fair, if not good, condition — and does not need so much work, and therefore does not require so much time, nor so great a quantity of exercise, to put it into a first-class

condition. This fact is either lost sight of or is not known by men who train, and they, instead of studying just how much exercise they should take, give the muscles, nerves and lungs more than they can do or need, and "staleness" is the result.

Athletes who are fond of exercise should be very careful not to become stale, and this will require no little amount of good, sound judgment. There are hundreds of men, especially among athletes, who imagine, if they do not exercise daily, that their bodies will not remain in good condition. Frequently they are overworking the already fatigued muscles when an absolute rest is needed. I have known of one instance where an athlete trained for three years, and at the end of that time ran a mile in four minutes and twenty-six seconds (4 min. 26 sec.), this being accomplished in the spring of the year. He continued to train very hard, and in the fall was so "stale" that he could not run a mile faster than five minutes and ten seconds. After an absolute rest of three weeks he ran a mile in four minutes and twenty-four seconds. This is a most perfect instance of overwork, and illustrates what rest will do for an athlete. The same rule holds good in all sports.

It may be laid down as an infallible rule that when a person, after having exercised for a long period, falls short of the standard he has been reaching he is overworking, and to improve his condition he must rest long enough to allow all the tissues in his body to regain

their former strength and fitness for exercise. It may be necessary to cease exercising for a period of three, six, nine months, or even a year to accomplish this. Many an athlete has improved wonderfully by observing the above fact. Mr. Ernest Ramsdell, who ran the hundred yards, while at Princeton College, in ten and two-fifths seconds (10 2-5 sec.), after giving up training for a year, came to the University of Pennsylvania to study medicine, and won the inter-collegiate championship for the hundred yards dash in ten seconds, and the two hundred and twenty yards in twenty-two seconds. I have spoken to him about this fact, and he said he felt he had worked too hard in former years for his age. This is one of many such cases, and many of my readers who have overworked know well how true this is. The overworked muscles and nerves try to do the work desired, when they are suffering not only from the contusions and shocks their fibres have received, but also from the excessive work given them, and try as they will they fail.

Athletes often work too hard in the gymnasium during the winter, so as to be stronger when spring comes, and to be in "condition" as soon as the weather will permit them to exercise outside. After going through this winter preparation they are surprised to learn, after exercising in the open air for three or four weeks, that their muscles and nerves have lost some of their old-time vigor; and instead of being able to do better, or so well as they have done in former years,

they do not reach their former standard. This is due to a condition of overwork, and there is just one cure for it, and that cure is a good, long rest, extending from two weeks to a year, according to the degree of overwork. It is very hard to make athletes believe this, and even when told, they will sometimes continue to work instead of taking the advice of those who have profited by experience. No athlete ever retrograded when overworked if he took a much-needed rest ; on the contrary he improves, provided the period of rest extends over a sufficient period of time.

Athletes who, on account of overwork, are not able to play football, row, run, jump, hurdle, vault, put the shot, etc., up to their usual standard cannot get out of condition, even if they rest for two or three weeks. They may possibly lose a little stamina, but a few days' training will enable them to regain it. I sincerely trust my readers will bear this point in mind and profit from knowledge, instead of disregarding it and having to learn it from their own practical experience by being defeated by a second-rate athlete.

Overwork, when continued, may lead to disease, and sometimes cases of typhoid fever are traced to it. This is exceptional in athletes, but very common among men who are compelled to labor for their daily bread in the heat of the sun, and are compelled to sleep in poorly ventilated rooms as well as eat poor or even bad food.

When overwork is pushed to its utmost the individual invariably complains of being greatly fatigued, and although he ceases his exercise, feels tired. This feeling will not disappear unless he rests. When such a condition presents itself, the individual had better remain in bed from two days to as many weeks, and eat the most nutritious and most easily digested foods. After doing this no exercise should be indulged in for at least a month or two, and if the case should be extreme a longer period should be allowed, in order that the bodily tissues may have sufficient time to regain their normal condition.

The bodily tissues may become exhausted without the athlete's noticing any material discomfort from fatigue; but if he be careful to note his weight he will find that he is steadily losing, and that he does not possess quite so much power of resisting fatigue. The condition of exhaustion is one that should be studied carefully by all persons who take exercise, in order to avoid any predisposition to disease resulting from ignorance of its effects upon the body.

Overwork invariably lowers the vitality of the individual. The way to treat an overworked person, in order to restore his muscles to their normal vitality, is to give him plenty of rest, good food, pure water, wholesome and pure air, an abundance of sleep, and to remove all things that have any disturbing influence on his mental faculties. It should never be lost sight of, that tranquillity of mind is essential to overcome

bodily exhaustion. The most minute details should be followed in every respect, so as to include everything which may be of assistance to the athlete in regaining his normal condition.

Exhaustion is frequently produced by compelling an athlete to perspire too profusely when exercising. The energy thus expended often exceeds the amount it should, and the recuperative powers of the body are seriously impaired, so that the process of producing perspiration does more harm than good. Muscular exhaustion not only affects muscular tissue, but also has a general depressing effect upon the whole body, frequently causing disturbances in other parts of the human machine. The most radical change in a person who has overworked his body is that his muscles, instead of becoming larger, actually grow smaller.

The heart muscle at first suffers with an over-development, which is frequently followed by expansion of the cavities; after this has taken place it begins to grow smaller and its power of enduring fatigue is diminished greatly. This is especially the case with track athletes, gymnasts, oarsmen, football players and others, who have conjoined dissipation with training. In addition to this wasting of muscles produced by overwork, there is also a form of overwork which leads to such an exhaustion of the nervous forces, throughout the body, that nervous prostration follows. All physical exercises not only tax the muscles but also the nerves and their centres. Every physical exercise

that necessitates any accuracy, produces a movement the co-ordination of which calls for an amount of nervous energy much greater than when accuracy is not required. Herein lies the great difference between physical exercises that are purely mechanical, and those which demand, not only a great amount of nervous energy, but also a proper use of that energy.

Athletes who take a great amount of violent exercise should be especially careful to avoid the evil results of overwork and exhaustion, by eating good, wholesome food and taking plenty of sleep. If the food be poor it will change the quality of the blood, making itself felt on the nervous and muscular systems, and finally on the whole body. Overwork and exhaustion generally show their effects upon those who neglect their sleep. The muscles, nerves and brain of the athlete are affected by exhaustion, because they are poisoned by the carbonic acid which is in excess in the blood. His heart and lungs also suffer from the same poison, and his skin and kidneys feel the effect of this noxious gas. If men who are fond of physical exercise would only make a study of the physical exercises they take, and not try to develop great, large muscles alone, they would never meet with the evil effects of exhaustion. Nearly every case of overwork is due to an absolute disregard of the bodily symptoms which are trying to tell the individual not to exercise. The lassitude, inactivity of muscles, indisposition to exercise, irritability of mind, poor appetite, lack of snap, restlessness

followed by sleeplessness, persistent loss of weight, headache, pale face, dry throat with slight cough, are the symptoms that tell the athlete when he is overworking; but he will not pay attention to these, because they are trifling at first, and it is only when they have produced disease, or a predisposition thereto, that he begins to regard them with a proper respect. I have seen many and many a good athlete overlook the symptoms I have mentioned, and because overwork and exhaustion did not come on instantly he thought they were of no consequence; but realizing his mistake when it was too late, he gave the greatest attention to every symptom in detail.

Many athletes do not believe in such a thing as overwork, and they argue that they have undergone the severest kind of training for three, four, or even five years, and have never felt the slightest degree of that excess. If one could but follow these men as years roll on I am sure he would find them believing in overwork. It is no argument to say that because an athlete has never suffered from the effects of overwork, he never will. He might argue just as well that he would never die, simply because he never had.

When those who exercise regularly wish to avoid the evil effects of overwork, let them consider, carefully, the question of rest the moment any symptoms I have enumerated begin to make their appearance; in this way they will learn to use excellent judgment, and will not suffer.

The words in this chapter are few, yet the chapter contains enough to guide anyone, who exercises regularly, in such a way that he will never subject his bodily tissues to the dangers of overwork and exhaustion; and in after years he will escape the diseases which so frequently are traceable to overwork.

CHAPTER X.

INJURIES.

INJURIES of importance sometimes occur to the athlete, while training for one sport or another, and although some of these are of little moment, others are so severe that they either require a long period of treatment to cure them, or in rare cases become incurable. Athletes should be careful when they sprain an ankle, injure a muscle, suffer from strained ligaments and tendons, rupture a blood vessel, injure a nerve, the membrane surrounding a joint such as the shoulder, elbow, knee or ankle, or break a bone. Many athletes have been compelled to retire temporarily, and some permanently, from the football field, the diamond or cinder path, simply because they did not give immediate care to the injury they received during a game or contest.

Men who occupy the position of pitcher on a baseball nine frequently suffer from a strain of the membrane covering the elbow joint. Many a pitcher has been compelled to retire permanently because he attached too little importance to a slight strain, and continued to use his arm when it should have been

given an immediate and absolute rest, for a period of time ranging from two weeks to two years. It is also true of men who play football; many are the cases of sprained knees that trouble a football player who neglects to take proper care of the injury at the time. Men who are fond of track athletics and field sports also suffer from injuries, which become a constant source of annoyance if neglected.

Fractures occur among all three classes of athletes, and should always receive the attention and care of an expert surgeon. I have seen one case of fractured bone caused, by muscular contraction, in an athlete while running the one-hundred-yards dash. A second case of fracture, of the humerus, came under my care in a student at the University of Pennsylvania, who fractured this bone by throwing a baseball. I also treated a third case of fracture, of the ribs, due to football playing, but this was before the rules had been changed forbidding mass plays. The accident occurred during a mass play just after a scrimmage had taken place. All of the cases mentioned above recovered completely, and might have been avoided had the athletes paid stricter and more careful attention to their physical training and well-being, instead of exercising spasmodically and without any judgment as to the amount of work to be taken.

Ruptures, or "break downs" as they are called by trainers, also result from violent efforts, and need careful attention.

Injuries to nerves sometimes follow severe muscular exercise, and result in an impairment of muscular contraction that greatly lessens the power of locomotion.

The great mistake athletes of all descriptions make after having received an injury of one kind or another, is in the treatment of their trouble. Frequently, they neglect their injuries entirely, and allow them to grow more troublesome, until the affected part becomes permanently impaired, or incurable. There is also a class of athletes who continue to use the injured part, endeavoring to cure their strain, rupture, or contusion, by applying a liniment, when the affected part should be given an absolute rest. Many athletes err by treating an injured member in the above manner, and only disable themselves to a greater extent by endeavoring to continue their exercise. Absolute rest in bed, with the part in a proper position, for twenty-four or forty-eight hours, will often help an injury more than all the additional treatment any physician or surgeon can prescribe.

Medication, in conjunction with absolute rest, is of vast benefit to the athlete, when troubled with any of the foregoing injuries, and will do much toward hastening a cure. As a rule, an athlete does not like to remain in bed, because he imagines the rest is going to lower the tone of his general physical condition ; but no athlete who is in prime condition can possibly feel any marked difference in a day or two, and in a great many instances the rest will not only be of lasting benefit to the injury he has received, but also to his

general physical condition. Should his physical condition be lowered by the period of rest his injury has compelled him to take, he will find that he can regain his former strength by exercising a little longer during the first week after his recovery.

It is very important to give proper attention to an injury the moment it has been received, for by so doing a vast amount of time will be saved, and the affected part recovers more quickly and thoroughly.

Injuries that are very slight do not as a rule need a doctor, and the only necessity for consulting a physician in reference to slight injuries arises when an athlete is anxious about his condition prior to competing in an important contest. Early advice from a physician is a safeguard against the aggravation of all kinds of injuries, and is always the safer plan to pursue.

When a misfortune of any kind befalls an athlete, if rest and rubbing do not cure the trouble quickly, that is, in two or three days, a physician should be consulted, because a great deal of valuable time will be saved, and the doctor's bill will be much less than when the trouble has become chronic. Many athletes will not follow, strictly, the advice and treatment of the physician after they have consulted him. Let me say to my readers that in such a case it is not the fault of the physician when the trouble is not cured.

A grave error sometimes occurs by beginning to exercise an injured part too soon. This occurs owing to the fact that the athlete can partially use the part

and without great discomfort. He, however, does not put the member to a very violent test until the day of a contest, and is surprised to find his old complaint returns. With such a condition of affairs he learns by experience what the doctor has told him, namely, that there was danger of bringing back the old trouble by using the affected part too soon; and he now laments, because he has found that it would have been better to have followed the sound advice of a physician, which would have enabled him to escape injuring the part a second time.

Athletes will frequently endeavor to exercise when they have a lame leg, a crippled arm or shoulder, a sprained knee or ankle, or an injured back; and they think they can overcome the trouble by giving the part that has been injured a good rub or by applying a plaster or a bandage. I have seen many athletes try this, and I confess before I studied medicine I did the same thing myself after having strained certain muscles. All the rubbing, bandages, and liniments I applied, which I did most conscientiously, did not cure me. The moment, however, I added "absolute rest" to the above treatment, the improvement was very marked, and in about four weeks my thigh muscles, where the strain had occurred, were as strong as ever.

Athletes who have once injured themselves in any way should, after recovering from their injury, begin their exercise very gradually and with greater caution, in order to avoid all possibility of a recurrence of the

trouble. More than one athlete has failed to take this precaution, and has suffered from a recurrence of the injury. Athletes should possess sufficient knowledge to treat their own minor troubles, such as slight bruises, sprains, and strains; but no athlete should endeavor to treat all of the troubles arising from exercise.

When a sprain, or in fact any kind of an injury, is severe, the athlete should place himself under the care of a physician who is thoroughly versed in the best methods of treating injuries; but before taking up the treatment of these in detail let me advise all athletes to consult a physician in every instance when a bone has been broken, or an abscess has formed. Neglect in doing this may lead to an ununited fracture, a chronic inflammation, or blood poisoning, which are troublesome, and require tedious treatment to cure.

Before taking up the treatment of sprains, strains, ruptures, contusions and fractures, it may be well to distinguish between the use of the word sprain and strain. A sprain is the result of a severe twisting of some part of the body, while a strain comes from an over-stretching of tissue; for example, sprains usually occur about joints, because these parts have been twisted; strains occur in muscles, because the muscular fibres have been over-stretched.

The word rupture needs no definition, but a rupture is not confined to blood vessels alone as many athletes suppose. A rupture may take place in the muscles, tendons and nerves.

A contusion is when the different tissues have been injured by being brought into sudden contact without producing an abrasion of the skin.

Fractures are instances where the bones are broken and are of many varieties. The kinds of fracture athletes are most commonly subjected to, are either simple, *i. e.*, when the bone is broken into two parts, or they are of the incomplete or "green stick" kind, in which instance the bone is splintered.

Before enumerating the methods of treatment to be followed by athletes who may suffer from one or more of the above accidents, I shall say that I do not deem it best to mention the treatment of fractures and abscesses, because no athlete, unless he has received a medical degree and practiced surgery for at least a year or two, should attempt to treat such a condition. Under no circumstances should one not skilled in medicine undertake such a responsibility.

The specific treatment of the foregoing troubles consists of the following methods, in the order named: Rest, which may be complete, *i. e.*, rest in bed, or incomplete, *i. e.*, allowing the athlete to walk about either with a cane or on crutches, according to the severity of the case. Should the injury be very slight, it will suffice to bandage the part with a bandage made of either muslin or rubber. If necessary when the injury is situated in either of the lower extremities or both, the athlete may rest the part by putting his limbs upon a chair at right angles to the body, or higher if desirable.

It is also a good plan, when retiring at night, to put a pillow or two beneath the covers, at the foot of the bed, so as to elevate the limbs and thus assist the venous blood back to the heart. It is surprising what a difference this will make in the time required to cure injuries. The application of hot and cold water is also of great benefit to sprains, strains, and contusions, and hastens the cure.

In the application of hot and cold water, the athlete should use hot water immediately after an injury has been received, and it should be as hot as he can stand it without injuring the skin. Athletes will be surprised to learn how quickly an injured knee, ankle, elbow, or shoulder is improved by the immediate application of hot water, and how greatly the inflammation about the part subsides. A good method in applying hot water is to make the water lukewarm at first, and gradually add a little boiling water until that in which the member is being bathed becomes very hot. The time for allowing an injured part to remain in hot water should vary from fifteen to thirty minutes, according to the severity of the injury. Hot water should not be used after the injury is more than six or eight hours old.

Cold water may also be used, but should never be used immediately after a joint or muscle has been strained or sprained. It is of greatest benefit after a period of about a day. The time allotted to bathing the parts should be the same as that allowed for hot

water. Cold applications may be used three or four times daily if necessary; but with the use of hot water one application will suffice, after which cold water should be used.

After bathing the part a bandage should be applied. If the bandage cause discomfort, then it should be re-applied, using great caution not to apply it too tightly, and being careful to see that each turn of it docs not wrinkle so as to cause an uneven amount of pressure. Uniform pressure is of the utmost importance in the application of all bandages. Rubber bandages are easier to apply in a uniform manner, but are more expensive, and the athlete, with a little care and practice, can soon learn to apply a muslin bandage smoothly, thus saving himself the expense of buying a rubber bandage. Rubber lasts longer, does not soil so easily, and is very easily washed. The muslin bandages vary in width from half an inch to three inches, according to the part to be bandaged. Bandages one-half inch in width are used for the fingers. For the wrist and ankle, from an inch and a half to two inches in width will suffice; while for the knee and shoulder, the width should be about two and a half to three inches. If abdominal bandages are used, they should be made as needed. A more expensive form of support is made in the form of silk rubber. This form of support is made both of silk and rubber, as its name indicates, and is commonly spoken of as a silk bandage, or a silk-rubber stocking. The bandage really resembles the leg of a

stocking, being about one-quarter or one-third as long. This form of bandage, ordinarily, is used for the support of joint troubles.

Rubbing is of the greatest value in the treatment of injuries. In the treatment of sprains of all parts of the body, and especially of those involving the joints, rubbing, when correctly applied, has been used most successfully. All muscular tissue that will permit of manipulation, readily yields to treatment by rubbing, and strains involving this tissue respond most favorably. The different joints throughout the body respond more quickly to the effects of rubbing according to the amount of muscular tissue in their proximity. The hip and shoulder joint, while greatly benefited by rubbing, do not yield so readily to the effects of the treatment as the knee, ankle and elbow; this is because more muscle surrounds the hip and shoulder, and the rubber cannot reach the bony structures so readily. Rubbing always increases the flow of blood to a part, and from this the congestion and exudation, in and around the injured part, are pushed outward and onward through the vessels known as lymphatics.

To cure an injury to a joint, the part may be rubbed directly over the seat of injury or a little distance from it. If the injured joint be rubbed directly over the seat of injury, care should be exerted in rubbing in order to cause little or no pain to the athlete, and to excite the blood current gradually. When rubbed at a distance, so much caution is not needed.

Always rub toward the heart—*i. e.*, in the direction the blood is being carried by the veins. Rubbing an injured part also assists the nervous supply, and this nervous element not only affects the joints or muscles, as the case may be, but also the skin covering them. It is an excellent plan, when rubbing is to be applied to a joint, or a muscle that is tender, swollen and inflamed, to begin by rubbing the healthy tissue some distance from the seat of trouble. Rub gently, and approach the injury gradually. After rubbing a short time the pressure of the hands may be increased somewhat, being guided in this respect by the comfort of the athlete, until deep manipulation is being well applied. Kneading may be added to simple stroking; first using one for a few minutes, and then the other, until there is a marked improvement of the affected part. It should be remembered that all athletes cannot be rubbed alike, and that if gentle stroking produces discomfort a firm pressure often proves agreeable and affords relief. The improvement and comfort which follow, after an injured part has been rubbed properly, can scarcely be believed until an athlete has been benefited.

The vast number of sprains, strains, and bruises received by athletes can be cured in from six to ten days, when treated properly with rubbing, rest and liniments; and, since these injuries can be cured in so short a time, it would lead one to conclude that they are not of such serious importance after all. Troubles

lasting for a long time from the foregoing injuries are, in the vast majority of cases, due to neglect and improper treatment. In all acute injuries, arising from the causes I have mentioned, rubbing must be applied cautiously and gently, lest it act as an irritant instead of a sedative, and be more productive of harm than of good. Sprains may be rubbed, cautiously, however, immediately after they have been received. All joint affections, after being rubbed, should have passive motion applied—*i. e.*, another person moving the joint. This should be continued cautiously, until there is perfect movement in the joint. Each period of time allotted for moving the joint should be regulated by the athlete himself, according to the sensation of comfort or discomfort produced. If there be great discomfort, it will suffice to move the joint a few times, once or twice a day. On the other hand, should there be no discomfort, then the joint may be moved for five, ten or fifteen minutes, two or three times a day.

Moderate applications of heat and cold may be used alternately in conjunction with rubbing in joint affections, and in a great many cases the addition of a simple liniment, prescribed by a physician, will add greatly to the cure of joint troubles. Scientific rubbing, or "massage," as it is technically called, is of inestimable value in some cases of "water on the knee."

Compression, by means of a bandage, after a joint has been well rubbed often acts most advantageously and should never be forgotten.

Counter-irritants are of great value in some cases of sprains and strains, but these, in the great majority of cases, should be prescribed by a physician. Applications of iodine may be made by the athlete, but he should remember that *one* good application is sufficient, and that the iodine should never be applied directly over the seat of injury, but around it. Blisters should not be used by any athlete, without the advice of a physician, since a great deal depends on the after-treatment when a blister has been applied.

Electricity is another means of treating sprains and strains, and this should also be given by a physician.

Liniments are of extreme value in the treatment of sprains, strains and bruises. The person using any liniment should understand its nature. If the part be swollen and inflamed, either in a muscle or joint, a soothing lotion, not a liniment, should be used; on the other hand, if the injury has become a chronic one, and there is no swelling worth speaking of, then the athlete should use a stimulating liniment, such as chloroform liniment, soap liniment, or pure chloroform. For ordinary purposes alcohol or whiskey, plain or mixed with a little rock-salt, is very good. If the athlete prefers he may use pure witch hazel, or dilute this with one-half water. Fusel oil is also a very good substance for ordinary rubbing purposes. It is nothing more than a crude form of alcohol. Its cheapness makes it very desirable, costing about one-fourth as much as pure alcohol. This may also be diluted, according to circum-

stances, should it prove too strong and irritating to the skin.

In concluding this chapter I shall enumerate the methods of treating the injuries I have been considering, in the order of their importance; and if athletes will follow this order, with ordinary precaution and intelligencc, they will be able to cure the great majority of mishaps which befall them.

1. Rest, either absolute or partial as needed.

2. Heat, dry or moist, used immediately after an injury has been received.

3. Cold, dry or wet, when the injury is from one to three hours old and thereafter.

4. Rubbing as directed.

5. Bandaging according to necessity of case.

6. Lotions and liniments.

7. Electricity as necded, given by a physician.

8. Tonics internally, prescribed by no one but a physician.

CHAPTER XI.

THE SKIN.

BEFORE considering the skin in its relation to exercise and training, it will be necessary to explain its construction in order that the athlete may understand the necessity of giving especial care to it when in training. It is an old saying that "cleanliness is next to Godliness," which is simply reminding every one that there is great necessity for keeping the skin clean. Bathing is supposed by many to be the only means of cleansing the skin; but rubbing also holds a very important relation to the hygienic condition of it. The skin receives more benefit, when rubbing is added to bathing, than if bathing be used alone. Rubbing the skin rids it of a great deal of material which, if allowed to remain, tends to stop up the glands, resulting either in impairment of function or disease.

Many persons are overtaken by diseases of the skin because they neglect to pay proper attention to cleanliness. When cleanliness of the skin is neglected, diseases of other organs also frequently follow, because these organs are called upon to eliminate the products that should be eliminated by the skin. The care of the skin

is much more important than any athlete realizes. If people in general would take a little more care of their skin, we should not see so many afflicted with diseases of the lungs, kidneys, digestive system and skin.

In this connection I would also add that care should be devoted to the hair, as well, since it is nothing more than a modification of skin, and is capable of becoming diseased, and transmitting disease, just as the skin may do.

The skin covers the whole external surface of the body and protects the tissues beneath it. It is composed of cells and fibres, there being two layers, a superficial one and a deep one. The superficial layer contains no blood vessels or nerves, and protects the deeper layer. The latter contains nerves and blood vessels. Injury to this causes pain, as any one will attest who has received a severe pinch. Over the whole surface of the skin we find little pouches which project downward into the skin and are called pores. There are tubes of which the pores form the openings, ending in two sets of glands, one called sweat glands, the other sebaceous. The former carry off perspiration, the latter an oily matter. This oily matter serves to lubricate the cells of the skin, and to soften the surface. To give the athlete a rough idea of the important part played by the pores of the skin, it may be well to say that the number in an average sized man is said to be 7,000,000, and since each tube is about a quarter of an inch long, the total length of the tubes would be equal

to twenty-eight miles. From this it will be seen that a great amount of perspiration may be eliminated through these tubes, and also the great necessity for keeping them open.

The other glands open into the mouths of hair-tubes and secrete oil. The skin, since it has innumerable blood vessels running through it, can not be injured in any portion of it without causing blood to flow. The skin also contains vessels known as "lymphatics," which carry an absorbing fluid into the interior, after which it enters the blood.

Nerves are also found in the skin, and are supposed to regulate heat and cold in the body. Further, there are nerves that preside over the nutrition of the skin and regulate the blood vessels. These govern the blood vessels, causing them either to contract and become smaller or to expand and become larger.

The functions of the skin are five in number. It regulates bodily temperature, is an absorbent, acts as a protecting agent, performs the function of breathing, thus being an aid to the lungs, and assists in the purification of the blood by eliminating certain substances, the chief ones being water, urea, common salt, and carbonic acid.

A reciprocal action also exists between the lungs, kidneys, intestines and skin. If the lungs, kidneys or intestines do not perform their functions as they should, the skin endeavors to assist in the work. Every one knows how freely one perspires in the heat of summer,

and how much perspiration is eliminated through the skin; while in winter, when it is cold, the kidneys are called upon to do the work. The skin also sympathizes with the liver, and if the liver does not perform its functions properly, the skin endeavors to assist it. This condition is very evident in a person who has ever suffered from the effects of jaundice, in which case the skin presents a yellowish appearance.

When proper care is taken of the skin, not only are its pores kept clean, but the functions of the skin are performed with more exactitude and with greater power. Therefore, it is of the greatest importance that the skin should be kept clean. The best time to cleanse the skin is upon arising in the morning, but any time given to this matter is better, by far, than neglecting it.

One of the most common causes of disease is the accumulation of dead skin, which remains on the surface of the skin and stops up the pores. Again, if the oil of the skin be allowed to remain too long on it, disease will follow, because this oil becomes rancid.

When treating the skin, it is a good plan to remember never to bathe when greatly fatigued or chilled, because the reaction that should take place will be wanting, or feeble at the best, and there is great danger of further depressing the bodily powers, from which rheumatic tendencies, coughs, colds, nervousness and indigestion originate. Persons should not bathe their

skin when perspiring freely. Bathing should be indulged in after perspiration has ceased and when the body is tolerably warm. The rule to go by in regard to the care of the skin, in this respect, is to regulate the bath by the degree of vigor and exhilaration experienced by the body. As soon as this has taken place, the bather should immediately dry his skin with a towel, and then rub his whole body from head to foot.

Many diseases of the skin are directly traceable to the clothing worn, hence a certain amount of precaution should be exerted in selecting the texture of the material. Rough materials frequently irritate the skin, and the color of the garment often leads to disease. Dark colors absorb more heat than light colors, while the latter ones, such as light yellow, white and gray, offer sufficient protection from the sun's rays, and absorb little or no heat. Clothing should fit loosely so that the skin may be more benefited by having a greater amount of air come in contact with it. Athletes in considering the care of their skin should always dress according to the temperature of the atmosphere, and not according to the season of the year.

Food has a great deal to do with the care of the skin, and many diseases of it are directly traceable to undigested food of all kinds. The many eruptions, so frequently seen on the faces of such vast numbers of persons, are frequently due to a disordered digestion. The food being improperly digested, finds its way into

the blood, by which it is carried to the skin, causing an irritation. This results in pimples, black-heads and scales. The influence of the digestive system on the skin is of great importance in regulating the condition of athletes. Those who suffer with disease of the stomach know how their skin is sometimes affected.

The quality of the food plays a very important part in influencing the action of the skin, as well as the quantity. A poorly regulated diet, especially in young persons, will invariably make its effects felt on the skin. The great fault and weakness of most persons with their diet is that they eat too much sugar. This produces an acidity of the blood which readily irritates the skin and often produces disease. A moderate amount, ordinarily, will do no harm. Sugar does not contain any nitrogen, and should rarely, if ever, be eaten in strict training, because it is nitrogen that is needed to impart energy to the athlete's bodily tissues.

The action of the bowels plays a very important part in keeping the skin healthy, and when the athlete's bowels become constipated, the skin suffers greatly. When the bowels do not act regularly the skin becomes poisoned with the products of intestinal indigestion. These products are absorbed by the blood, and, finding their way to the skin, affect it. Athletes, as well as other persons, should cultivate the habit of evacuating their bowels regularly. When this has been acquired the skin will not suffer. It is surprising how many

people neglect their bowels even when nature endeavors to tell them that the bowels should be attended to.

The skin is not the only part of the body that suffers from inattention to the bowels. The liver and kidneys also feel the effects of constipation, and the brain, alas, too frequently suffers, making the individual conscious of a headache that might be avoided if the bowels had not been neglected.

Frequently diseases of the hair result from lack of attention to the skin, and we see one's head full of dandruff, scales, and even scabs, which cover the whole of the scalp. The diseases of the hair are in many instances directly traceable to a want of cleanliness, and this is often brought about by the fact that a great many persons imagine they will take cold if they wash their heads. Dandruff, which usually results from a want of proper washing of the head, is accompanied by a thinning of the hair and itching, which is very annoying. Most people usually go to the barber to get an occasional shampoo for this trouble. This cleanses the scalp for a time, but, unless the individual is careful thereafter to give the proper amount of care and attention to his hair, the disease will return. No greater mistake is made than permitting "hair-oils" to be used by the barber upon the hair, because these oils frequently stop up the hair follicles, and in addition to this the natural oil of the skin cannot perform its function and becomes rancid, thus aggravating the trouble.

The empiric use of hair washes, and hair tonics also, produces diseases of the hair and scalp, because these washes are often too stimulating in their nature, and produce inflammations which lead to disease.

No person whether an athlete or not, suffering either with a disease of his skin or his hair, should allow a quack to treat him, because more harm than good will result, and the disease may become chronic, at which stage it will either be incurable or take a much longer time to cure than it would had a physician been consulted.

Another disease due to a want of cleanliness of the skin, and one that is frequently met with, is ringworm. This is a cause of baldness, is extremely annoying, and in addition is contagious, being most easily transmitted to persons who neglect to keep their hair and skin clean. Much anxiety is attached to it when a person is afflicted, and frequently the nervous strain thrown upon the person has a very marked constitutional result. The discomfort caused by the itching of the head brought about by uncleanliness is far from pleasant, and when the itching has advanced to any marked degree the person's sufferings are often extreme and intolerable.

There are numerous other diseases due to a lack of proper hygienic care of the skin, but I do not feel that they come within the scope of this short chapter. I have mentioned only those diseases most commonly found among athletes, and I may add that all of them

may be avoided by remembering that they are chiefly produced by *dirt*.

If proper care be taken of one's skin and hair, the body acquires a better aptitude for warding off diseases, and the individual enjoys good health especially when sufficient exercise has been taken to stimulate all of the functions and tissues. Exercise without care of the skin and hair often produces diseases of the skin, because the waste products which should be washed from the skin, stick to it and fill up the pores, impairing its functions, finally leading to or producing diseases of it or some other part of the body.

Soaps often produce diseases of the skin because they are too irritating, and I would advise those who wish to avoid any trouble from such to use a little care in their selection. Should a soap make the skin red and scaly it contains too much alkali, is too hard, and should be discontinued. For my own purpose I have always found that a good Castile soap would answer. This may not answer every case, but as a general rule any soap that is not irritating or does not give the skin a shriveled and scaly appearance after using it, will suit the purpose. Athletes in using soap should be very careful to see that the skin is thoroughly washed after its use, so that the pores may not be stopped up. A neglect of this may often produce disease by impairing the functions of the pores.

CHAPTER XII.

TRAINING IN GENERAL.

THE contents of this chapter may be applied, in a general way, to the training of an athlete for any kind of a contest for which he wishes to condition his body. Hints will also be given where the athlete desires to train for special events such as running, jumping, walking, basketball, football, etc.

If a person wishes to train for a contest of any kind, he should always ask himself the following questions: Have I the strength of constitution to endure a course of training? Do I possess the will power to train faithfully? What kind of exercise do I need? How much do I need? Are there any parts of my body which should be systematically developed prior to going into strict training? What is the most suitable time for exercising? What should be the nature of the contest for which I intend to train? Is it possible to train for more than one kind of a contest at one time? How long will it take me to get into condition? What dangers am I exposing myself to? How can I avoid these? How long will it take me to accomplish what I desire? Am I addicted to any habit that must be given up?

Every person who desires to train for any contest should, at the outset, undergo a rigid medical examination so as to be sure he is not afflicted with some weakness, or organic trouble such as heart disease, lung trouble, kidney complaint or nervous debility; and under no condition should a person enter a contest of any kind unless he *is* well trained.

If the foregoing precautions be taken, systematic work be prescribed and conscientiously followed, no evil results will manifest themselves, and the athlete will also obtain a good strong, healthy constitution which will be of great benefit to him in after life.

If, on the other hand, he does not adhere strictly to the laws governing his exercise, he may injure his health to such an extent that he will suffer ever after.

Let me warn the athlete who trains and dissipates at the same time, not to do so, because he will break down and inevitably be overtaken, sooner or later, by disease ; I have seen it happen. But I have yet to see or hear of the first death which can be traced directly to the effects of training upon an athlete who strictly obeyed the laws governing a systematic course of training ; and this statement will carry additional weight when I add that I have seen over five thousand contests, including running, jumping, walking, bicycle riding, hurdle racing, putting the shot, throwing the hammer, pole-vaulting, football games, rowing, baseball, tennis, fencing, boxing, cricket, handball and basketball.

If parents were aware of the true causes of disease in their sons, a greater number of young men would be allowed to train for athletic contests, instead of being forbidden, because training has a great tendency to keep young men from indulging in dissipation and associating with immoral companions.

All athletes who enter a contest of any kind should remember that the brain plays a most important part, and those who use their wits in conjunction with their muscles and nerves are the ones who win. A great deal depends on using one's wits, or in other words the brain, at the right time, and many a contest is lost because the athlete does not grasp his opportunity at the proper moment.

Every athlete who wishes to become a champion should have his wits about him always, because if he has not he will lose many a contest he might otherwise have won. Further than this, all persons who train should do so with an unlimited amount of determination, or "grit," as it is called, for it is the very means of grasping a victory from an opponent when defeat seems certain.

The athlete who enters a contest, after training faithfully, and who is in proper condition, with the determination to "do or die," is the one that succeeds in the great majority of cases, unless he is entirely outclassed. No athlete should ever allow himself to be influenced by what he hears about other competitors and their doings. These reports are, very frequently,

brought to his ears for no other reason than to excite him, and if he allows himself to become excited it will diminish his chances of winning. When competitors or their friends try to "rattle" or "queer" you by talking to you, simply come to the conclusion that you are the one they are afraid of. No matter what happens, keep a cool head.

Every athlete who trains, no matter what the nature of the contest may be, should always seek to develop every part of his body so that he will be symmetrical, that is, the muscles of both upper extremities should be equal in strength and development, as well as those of both lower extremities. Those covering the chest, abdomen, back and loins should also receive special attention; and the most marked importance should be attached to the development of the heart and lungs, because the "staying power" of the athlete depends greatly on these organs, and the more thoroughly they are developed the better will the endurance of the contestant be.

The prime object in all contests, where training is required, is to get the athlete into a condition so that his body may be able to accomplish a feat which calls for all the energy he possesses. In other words, it is perfecting the organism so as to obtain a high degree of activity and endurance.

All athletes, after exercising for some weeks or months, learn that the conformation of the different parts of their body undergoes modification, although

there is no material change in the structure of the different tissues.

Every athlete, when training, should endeavor to acquire a certain kind of temperament which will be capable of furnishing an aptitude possessing the power of readily adapting itself to changing conditions.

While an athlete is in training, his powers of strength and endurance are greatly increased; but these begin to disappear the moment his training ceases, and, after three or four months, have disappeared almost entirely, the muscles, nerves and lungs retaining a small portion of the power gained.

To keep in condition one must exercise continually, and after once getting into condition the greatest care must be taken so that the athlete may not overtrain and become "stale." The condition of an athlete when training depends upon his becoming accustomed to exercise, and the class of athletes whose occupation calls for a great amount of muscular exertion do not need such vigorous training as those whose occupation calls for little or no muscular expenditure.

The benefits derived from training are astonishing when the auxiliary conditions of bathing, diet, rubbing, sleep and good ventilation are added.

A great many athletes imagine they must necessarily lose a certain amount of weight when training. This is not the case, and frequently only applies to athletes who are of a nervous temperament. These athletes, as a rule, lose a few pounds in weight, usually

from six to ten, provided they do not possess a superabundance of adipose, or fatty, tissue, in which case the loss will be greater. On the other hand, some athletes gain in weight when in training. This is due to the fact that their muscles readily assimilate substances which build up muscular tissue, these materials being obtained from the food which is eaten.

All classes of athletes should remember that it is of paramount importance to keep one's mind in a tranquil state when training for a contest, or during a competition of any kind, because the nervous disturbances caused by a turbulent mental condition may so upset the whole constitution of the athlete that defeat will inevitably follow. A disturbed mind not only affects the contracting power of the muscles, but also causes the heart-beats to become accelerated and irregular. The lungs feel the effects of it, and respiration is by no means so rhythmical and perfect. The kidneys suffer from mental worry. The spinal cord and nerves leading to the muscles are so greatly impaired by the mental changes which take place, that an undue amount of nervous energy is wasted, which lessens the athlete's chances of winning to a great extent.

The consideration of food suitable for training has received due attention in the chapter on diet. No one will deny that an increase and an accumulation of energy result from training when a proper regulation of diet is used. The idiosyncrasies of each person should always be respected when prescribing a diet,

lest more harm than good be done by producing an irritable disposition. It is an old saying that "what is one man's meat is another man's poison;" but certain kinds of diet can be used in training which will benefit a great majority of athletes, and enable them to accomplish better results than if they exercise without regard for the food they eat. Diet in training is used to add to the tissues which do the work, that is, the brain, spinal cord, nerves and muscles; and to cause the disappearance of all tissues which are of no value.

The chief substance which should be burned up by the body and made to disappear when one goes into training is fat, because, not only is it a great hindrance from its weight, but it is also the cause of a waste of energy. All fat persons should get rid of this substance, as quickly as possible, without bringing an undue strain upon their system. Running, bathing, and proper diet will soon cause this to disappear.

A very important fact is that few, if any, persons can undergo the same amount of training, either in degree or kind, in order to accomplish the same result. If a thin, nervous person were to adopt the same kind and amount of training that a muscular giant employed, the result would be overwork and exhaustion, which often so injures one's constitution that diseases such as consumption, heart disease, nervous dyspepsia, typhoid fever, intermittent fever, and nervous debility, follow. Training should invari-

ably be regulated by the temperament of the athlete, the strength of his constitution, his age, and habits.

If a person has inherited a good, strong, robust constitution so much care is not necessary as where one is dealing with a constitution which is healthy, but weak. In either case it is safe to be extremely careful, and obey the laws of training. It should be remembered that the object of training is to get an amount of energy out of the human machine which will enable the athlete to perform his task in a manner that will make him superior to all other competitors.

Athletes who wish to train for different athletic sports, cannot be impressed too strongly with the fact that one is rarely if ever able to attain championship form in a short time. This is because it requires a great deal of practice to teach the chief parts of the body which are used, to act in perfect harmony with each other, namely: the heart, lungs, brain, spinal cord, nerves, and muscles.

People who have been accustomed to exercise the greater part of their life may train harder than those who have not. If a person has not indulged in exercise in childhood, boyhood, and early manhood, he should spend two or three years in developing a symmetrical body, under a competent teacher of physical education, with proper medical guidance, before beginning a strict course of training.

No person who is under eighteen years of age should engage in strict and severe training unless he

has been accustomed to exercise all his life, and even then he should be extremely careful not to overdo the matter, lest disease may follow.

One should be especially careful between the ages of fourteen and eighteen, because growth and development are very rapid during this period of life, and these call for an additional amount of bodily energy.

During a contest never lose sight of the fact that your competitors are just as tired as you are,—perhaps more tired,—and no matter what happens, always finish a contest, even if you are the last man. I have seen many a victory won, by following the above advice, by athletes who just managed to defeat their opponent in the last stride, when it seemed as if they themselves would be defeated.

If an athlete possesses a good heart, a good pair of lungs, and good muscular development, he is sure to do well in training, especially when a great amount of nervous energy is added to a level head.

One may have a great deal of nervous energy but may not know how to use it, and hence I have added the factor of a level head, because without this, results in contests will often be negative. I should advise all persons who train to remember that being defeated by a competitor once, twice, or a greater number of times, does not mean that the competitor will always defeat them. I well remember seeing Mr. Davis of Harvard, defeat Mr. Taylor of the same college and class during freshman, sophomore and junior year in the two-mile

bicycle race at the inter-collegiate games in New York city, while in senior year Mr. Taylor carried off first prize. This is one of many cases I might quote. Remember that patience and perseverance conquer all things.

I have often been asked why one athlete will defeat another, and while the question is sometimes puzzling, the following causes will be found to be true in the great majority of cases. One athlete may be older than another. This applies between the ages of fourteen and twenty-two or twenty-four. He may have trained longer and a greater number of times than another, or may be slightly over-trained or slightly under-trained. He may be nervous when his opponent is cool, confident and collected. One competitor may have greater grit and better judgment than another, or may be more regular in his training, and his moral habits may also be purer. Man's moral nature should never be abused, especially while training, and dissipating should be looked upon as a crime.

If athletes who train only realized how much importance should be given to everything governing training, and especially to habits, many records would be made and many victories won by men who have never been better than third-rate athletes.

While training it is best to keep out of the night air, because it is damper, and the impurities and poisonous materials which are eliminated through the lungs are more easily exhaled in a dry air than in a damp one.

Under no conditions should a person compete just after finishing a meal, because the food which has been eaten will not receive a sufficient amount of blood to digest it thoroughly; the blood, being called for by the muscles, is taken away from the digestive organs and these organs suffer greatly.

In all contests and even during daily practice, it is best to compete or exercise from three and a half to five hours after eating. In so doing a sufficient time has been given for the digestion of food, and one also eliminates the possibility of vomiting, which often occurs when an athlete disregards the laws governing digestion. If you must compete shortly after eating, eat a light luncheon. One should always eat slowly whether training or not, so that an undue amount of energy may not be called for by the digestive organs to break up the foods which have not been thoroughly masticated. Solid foods should be of a quality requiring a minimum amount of mastication.

Never run too many trials when training; once a week is often enough, and, in some cases, too often.

Every system of scientific training should have a fourfold object: (*a*), to increase the muscular and nervous strength of the individual; (*b*), to develop the power of precision, forethought, perseverance, decision, patience, self-control, judgment and self-denial; (*c*), to increase the power of resisting fatigue by strengthening the heart and lungs; (*d*), to gain an instinctive knowledge of the total amount of energy one possesses,

so as to enable him to use it in the proper way and at the proper time.

There are hundreds of athletes who train for years and are never successful, because they have never made a thorough study of the objects I have enumerated. If more persons who train would not take their exercise in a mechanical way, but would make a study of themselves and scientific training, I am sure America would produce more athletes like Wefers, Chase, Fitzpatrick, Conneff, Sweeney, Bremer, Mitchell, Gray, Bucholtz, L. E. Myers and Frank Murray.

There is no reason why America should not outclass every nation on the face of the globe, because she is the most progressive of all countries, and her scientific advancement in training for all kinds of sports has been phenomenal during the last decade. Her athletes in the last ten years have equaled and, in many instances, surpassed records made by athletes in various countries, and for some events American athletes have the honor of holding the best records in the world.

When an athlete wishes to make a record, he should always observe, if possible, the best men against whom he intends to compete, and even train with them when practicable. In so doing, he will not only learn their methods, but will also gain greater confidence in himself, which will be of inestimable value when entering an open competition. Every person who trains should make a study of his muscles, because as soon as he

has complete power of contracting and relaxing them in proper rhythm, he has conserved a large amount of energy, and has gained a power that will enable him to perform his feat more easily and gracefully than ever before. No athlete should be discouraged if he does not learn quickly how to do this, for all the labor and thought he gives to it will be more than repaid to him by the improvement he is sure to make.

Boys should never be allowed to train so long, hard, or strictly as men, on account of the difference in their age, strength, growth and development.

Light training will strengthen the constitution of boys if properly prescribed and carried out, while too severe training often leads to serious constitutional diseases. The kind and amount of exercise an athlete should take when training for a contest is materially regulated by the nature of the contest.

When considering the amount of work required for any contest, special care and attention should be given to three important factors: the nervous system, the respiratory apparatus, which should be trained so that it will give a rhythmical co-ordination of movement, and the muscles. It frequently happens that men are possessed of strong muscular ability and show wonderful muscular development, yet when an exercise is prescribed calling for breathing power, a marvelous disproportion manifests itself between respiration and muscular work, and the athlete finds he is unable to endure even a moderate amount of

fatigue. In fact he cannot run half a mile at an ordinary pace without becoming winded. On the other hand, the athlete who is possessed of good breathing power and has only ordinary muscular ability can run four or five miles at a fair pace without experiencing the slightest degree of fatigue. Some athletes become so nervous that muscular contraction is greatly diminished and breathlessness begins, in a minor degree, before they have started to compete. All athletes of this class should strive to overcome such a condition, and may accomplish it by persistent determination and practice. If an athlete once possesses good control over his nervous system, and a good lung capacity in conjunction with well-developed muscles, he is sure to accomplish wonderful results.

Frequently athletes train for different events, such as running, walking, boxing, rowing, jumping, etc., regardless of symmetrical development. Many athletes who run, walk, ride a bicycle, and jump, have a tremendous development in their lower extremities, while their upper extremities, chest, and back, present a hideous picture, because they are undeveloped. These athletes imagine that nothing but their legs should be developed, and they argue that such should be the case because their legs are employed to a greater extent than any other part of their body. A great fallacy exists in this belief, and I am upheld by scientific knowledge in saying that the arms, chest, and back play as important a part as the legs when I quote such men as Mr. William

Byrd Page, who at one time held the world's record for the running high jump, namely, 6 feet 4 inches. He has often told me his arms, chest and back helped him over the bar, as much as his legs. Another man who was very symmetrically developed was Mr. Winchester Osgood, who at one time held the collegiate record in the two-mile bicycle race. Mr. Everett J. Wendell, of Harvard, Mr. Harry Brooks, of Yale, and Mr. Luther Carey, of Princeton, were beautifully built athletes whose records are well known. I quote these instances, and I could quote many more, to show how essential it is to develop every part of the body. In fact, it may be laid down as a law that unless the body is developed symmetrically there will be more or less weakness in one or more parts of it.

While training for any given contest exercise should be taken gently, slowly, and in small amounts in the beginning, and gradually increased. In this way one will never overdo the matter, or subject himself to strains, fractures, sprains and ruptures, which may occur when these considerations are disregarded. I have seen two cases of fractures resulting from a sudden use of the muscles when they were not well trained: one a fracture of the body bone, or pelvis, the part broken being the right anterior superior spine; the second case was a fracture of the right internal condyle of the humerus.

When training for a contest, for the first time, at least twelve weeks should be allowed for preparation, so

that the body may have plenty of time to educate each tissue to do its work properly, and to the fullest extent. If the above number of weeks be allowed, and the work be taken as it should, no evil results are likely to follow, even when an athlete enters the severest kind of a contest. Some trainers and athletes believe that six weeks is long enough to allow one to get into condition for a contest. This may apply if an athlete has been trained before. It is by no means the best plan, however, to allow too short a period, not only from a scientific standpoint, but because experience proves that the body maintains its condition better when the process is not accelerated. If we look at the time required for training, no one will deny that twelve weeks will enable one to get into condition with little or no strain, while six will call for a greater expenditure of energy in half the time.

Again, some athletes are so constituted that it is not possible for them to get into condition in less than twelve weeks under the severest training. If an athlete has trained for several years—spring, summer and fall, and perhaps in winter—at stated intervals, then he may be able to get into condition in six or eight weeks; but this is not always the case, and is no criterion to go by. I have mentioned twelve weeks because it will apply in the great majority of cases. The twelve weeks may be divided into the following periods: first three, second three, third three, and fourth three. During my ten years of active, practical athletic work,

I utilized these periods of three weeks as follows: during the first three I would take very gentle exercise daily, except Sunday, remembering to work all parts of my body, bathing once a day, a few minutes after exercising, after which I dried myself well with a towel and rubbed my skin well with flesh brushes, so as to give proper tone to it. Then my whole body was bathed with alcohol gradually, and I was rubbed thoroughly until the skin was perfectly dry and the circulation throughout it good. The exercises I indulged in during the first three weeks consisted of gymnastic work and running slowly, regulating the distance according to my feelings and the condition of my wind.

The second three weeks the same course was pursued, increasing the severity of the exercises a trifle. The third three weeks the work was increased so as to compel me to expend about three-quarters of the total amount of energy I possessed. The last three weeks I would expend about seven-eighths of my total amount of energy, thus keeping well within my bodily powers. The exception to be made to this rule is when an athlete is desirous of making a "trial" of his ability. I will speak more in detail of this later on.

Once for all let me say, when training for any kind of a contest, no matter whether it be track athletics, football, boxing or rowing, that long-distance running, such as from two to five miles, is by far the best exercise for cultivating wind and endurance. Auxiliary

exercises such as dumb-bells, club-swinging, the use of chest-weights, the traveling-rings and punching-bag, may be taken to develop different groups of muscles, but these in themselves usually do not give sufficient work to the heart and lungs.

CHAPTER XIII.

RUNNING IN GENERAL.

IF an athlete is training for a distance varying from one hundred yards to one mile, his speed must be regulated accordingly. Short distance or "sprint" running, as it is called, should be practiced with distance running, to give the athlete both speed and endurance. Speed may be cultivated by running distances varying from fifty to three or four hundred yards, while endurance is acquired by running from three to five miles. After an athlete has once gained a sufficient amount of endurance, he may devote all of his time to sprinting. Athletes who run very short distances (*i. e.*, from one hundred yards to four hundred and forty yards) can, as a rule, acquire enough endurance for these distances by running a little further occasionally.

No athlete can ever pay too much attention to sprint running. The faster he can sprint the more speed he acquires and the more perfectly he trains his whole nervous system. It is an excellent plan to rest a whole day before a contest, and in some instances, where endurance is an important factor, such as long-distance races, e. g., a mile and upward, wrestling, football,

rowing, etc., three or even four days' rest will be of immense benefit to the athlete. Do not fail to take a bath and be rubbed during the days you are resting, unless they tend to make you feel languid. When an athlete is on the "wire-edge" of condition he should remember that he needs very little exercise to keep him in prime condition, and the moment he feels that his muscles do not react well, he should rest for a few days. No athlete should ever worry about his condition when he is well trained. A rest of a few days cannot possibly do any harm, but overwork continued even for one day may be sufficient to cause defeat.

POSITION, PACE AND STRIDE.

Athletes who run, rarely, if ever, study a means of locomotion by which they may get the greatest amount of progression with a maximum velocity and a minimum expenditure of bodily energy.

The position one should assume when running, no matter what the distance may be, is as follows: the arms, or more properly speaking, the upper extremities, should be used chiefly from the shoulder, with precision, and be taught to swing in harmony with the legs, or lower extremities; the right arm moving with theleft leg, and the left arm with the right leg, in order to maintain perfect balance and assist speed. The trunk and head should be allowed to assume their natural position, which, if a person carries himself properly, will be in the erect posture, or nearly so. Never lean forward.

All distances under and including one mile should be run upon the toes, while distances over one mile should be run upon the ball of the foot, or the part just back of the toes.

Runners should put their feet out in front of them in a perfectly straight line, making the advancing step with one foot when the other is directly beneath the body, keeping each arm in its relative position and the legs close together, in order to concentrate their energy.

Never kick your heels up behind you, that is behind the axis of your body, because it will be a loss of locomotion and also of time. As one progresses, alighting first on one set of toes and then upon the other, or ball of the foot, as the case may be, great care should be exercised in coming down upon the ground lightly. If attention be paid to this the body will escape a great deal of unnecessary jarring, which is of extreme value to the muscles and nerves. Too much attention cannot be paid to the position of the body and the mode of locomotion in running, since these are of prime importance in assisting the human machine to get the greatest amount of speed out of it with the least amount of waste and resistance.

This position is the one used by all first-class athletes. Occasionally one will meet an athlete who has an awkward gait, and who runs very well; but what might he have done if in the first place he had acquired a mode of progression based on scientific principles? When an athlete has an awkward way of running, and

has been accustomed to it for years, it is best for him not to change, because in trying to learn a new way of running he may spoil his speed entirely.

The athlete should aim to run easily and gracefully, remembering never to hold a single part of the body in a rigid state, except in "spurting." The muscles of the body constantly should be educated to contract and relax with little or no effort, which can be done by co-ordinating the movement properly, and the energy thus conserved will be useful when one desires to increase his pace.

Pace is a thing which takes the keenest judgment, and often requires years of experience to master it. Many athletes would improve greatly if they only knew how to judge their pace. The knowledge of pace can be acquired by trying to run certain distances in a fixed time, such as a quarter-mile in fifty-eight seconds, fifty-six seconds, fifty-five seconds, or faster; a half-mile in two minutes and five or two minutes and ten seconds; a mile in four minutes and forty seconds, four minutes and fifty seconds, or five minutes. Where one desires to run any distance in very fast time, such as 100 yards in ten seconds, 220 yards in twenty-two seconds, a quarter of a mile in forty-eight or fifty seconds, a half-mile in one minute and fifty-five or fifty-six seconds, a mile in four minutes and twenty or thirty seconds, the strictest attention must be given to pace.

By stride is meant the distance covered in each step. A good stride is one which will cover about

seven feet, seven feet two inches, seven feet four inches, or seven feet six inches. It is a great mistake to overstride, because in so doing an unnecessary amount of energy is wasted, and fatigue comes on more quickly. If one is able to stride seven feet at first, he is doing well, and it is best to increase the stride by inches, so that one may gradually become accustomed to it. In this way a good stride may be attained without unduly taxing the muscles or wasting energy. Never endeavor to accommodate your stride to that of another competitor, because it will not only spoil your own pace, but will also change the rhythm of your movement, which will completely upset your calculations, by interfering with your heart, lungs, and nervous system.

An improvement in speed most commonly manifests itself in athletes after they have reached the age of twenty-one. After this there is little improvement until the age of twenty-three, when a further improvement occurs; and from this time until the athlete reaches the age of forty he will be at his best. After this age, bodily tissue is not so strong, and he will not do so well. Light exercise should be taken, and nothing more.

Too much walking should not be indulged in by the athlete who is keeping himself in condition by other exercise, as it is apt to produce slight overwork, and lead to staleness.

Never become frightened or disheartened by being passed by one of your competitors, because he usually expends all the energy he possesses to get past you,

and is likely to be overtaken by you if you only stick to your work with unflinching determination.

It is an excellent plan to lie down, flat on the back, for ten or fifteen minutes before entering a competition, being careful not to lie down in a damp place, or on anything damp, because it will stiffen the muscles. The whole morning may also be spent, on a sofa at home, in the same way, unless the race be run in heats, in which case matters of rest will have to be adjusted accordingly.

Another good thing to remember just before entering a contest is to take from six to ten deep, full breaths, in order to change the air completely in the lungs. This will defer the onset of breathlessness.

Also have your trainer give you a gentle rub and jog up and down the track for about fifty yards, so as to warm up and bring your muscles into action.

In all races toe the mark the last man. By so doing you will not be compelled to remain on the scratch, or mark, so long as other competitors. If other competitors should also be up to this point, then walk to the mark with them, but do so a little more slowly, and in this way you can manage to "toe the mark" last. When once on the mark, assume the position you have practiced in training, doing so with the determination to remain perfectly still until the moment the pistol is fired; then start as quickly as possible.

Do not try to "steal on the pistol," *i. e.*, start before the pistol is fired, because you may be penalized a yard

or two for such an attempt, or be disqualified. Moreover, you are only cheating yourself by endeavoring to steal a yard or two, and should you be successful now and then it only handicaps you in subsequent contests.

Athletes who run short distances should practice starting a great deal, in order that they may be able to get under way quickly. This is of the greatest importance. The positions mostly used in starting are three in number. The one which is, perhaps, most frequently used at present is the crouching position. This is as follows: if the competitor be right-handed he puts his left foot on the mark, so that his toes just come to it; then he puts both hands on the mark by kneeling, his right foot being fixed firmly in a small hole directly underneath his right buttock. This position may be reversed, and is used especially in sprint races.

The second position is a standing position, and is as follows: the mark is toed as before and the small hole is made as in the first position, but the competitor does not kneel; he allows the weight of the body to come upon the left foot, which is the one on the mark, while the right occupies a small hole a foot or two behind him, his right knee being slightly bent in order to give him a good push when the pistol is fired. The arms are stretched out full length, or nearly so, the right being in front and nearly at a right angle to the body, thus assisting the left foot in balancing the trunk, while the left arm is held in the same position behind the

body and assists the right foot. This position reversed applies to a left-handed athlete.

The third position is one in which both hands are held behind the body, on one side, either to the right or left, the feet assuming their position as before, according to the desire of the person, that is, whether right or left handed, both arms being thrown forward when the competitor starts. This position is rarely used now, and does not seem to me to be a good one.

A gencral rule which may be followed is to assume the position in starting, which is most natural. The starting position for athletes who walk is the second position, but in case of walking, it is not necessary for the walker to dig a small hole in the ground, because his shoes differ.

It is a good plan to bandage the legs and arms, so as not to interfere with the circulation of blood, for a few hours during the morning of the day you intend to compete, in order to give them an additional rest, and to lie down after the legs are bandaged.

PART II.

TRAINING FOR SPECIAL EVENTS, INCLUDING TRACK ATHLETICS, FIELD SPORTS, BICYCLING, FOOTBALL, AND BASKET-BALL.

STANDING START.

LIST OF EVENTS.

One hundred yards dash, - -	(100 yds. dash)
Two hundred and twenty yards dash,	(220 yds. dash)
Three hundred yards dash, . - -	(300 yds. dash)
Four hundred and forty yards dash,	(440 yds. dash)
Four hundred and forty yards relay race,	(440 yds. relay)
Six hundred and sixty yards dash, -	(660 yds. dash)
One-half mile run, - - - -	(880 yds. run)
One thousand yards run, - -	(1,000 yds. run)
Running one, two and five miles,	(1, 2 and 5 mile runs)
One hundred and twenty yards hurdle,	(120 yds. hurdle)
Two hundred and twenty yards hurdle,	(220 yds. hurdle)
Sack-racing, - - - - - -	(On the flat)
Sack-racing, - - - - -	(Over hurdles)
One mile walk, - - - - -	(1760 yds. walk)
Running broad jump. - - - - - - -	
Running high jump. - - - - - - -	
Pole-vaulting, - - - - - -	(For height)
Pole-vaulting, - - - - -	(For distance)
Throwing the sixteen-pound hammer,	(16-lb. hammer)
Putting the sixteen-pound shot, - -	(16-lb. shot)
Throwing the fifty-six-pound weight,	(56-lb. weight)
Bicycling from one-quarter to five miles,	(440 yds.-5 miles)
Football and Basket-ball, - - - - - -	

CROUCHING START.

CHAPTER XIV.

SPRINT RACES.

100 YARDS DASH.

THERE is no distance which requires greater speed, a better control of one's muscles and nerves, more composure, and greater perseverance and practice than running one hundred yards.

Few men among the many who train for this distance ever learn to run it in ten seconds. The athlete who is able to make such remarkable time well deserves the name of "Champion," which he surely is and which he will be able to prove many times against all comers in open competitions.

Mr. Owen, of the Detroit Athletic Club, won the amateur championship of America in the phenomenal time of nine and four-fifths (9 4-5) seconds. Mr. Luther Carey, of Princeton College, who could undoubtedly run this distance in ten seconds, as he demonstrated at the annual intercollegiate championships held at Berkeley, New York City, has also been accredited with running the distance in nine and four-fifths seconds, while Mr. B. J. Wefers, of Georgetown University, has run it in nine and three-fifths (9 3-5) seconds.

More depends upon the start one gets in the hundred-yard dash than on anything else, and here let me say it sometimes takes an athlete a year or two to be able to have perfect control of himself when once upon the mark. A great many athletes lose, when running this distance, by being penalized or disqualified for starting too soon.

The daily work one must undergo, when training for the hundred yards, is as follows: spend your first three weeks in running two or three hundred yards slowly, say at about five-eighths speed. Also practice starting half a dozen times, always by the report of the pistol, so that you may train the ear to catch the sound immediately, in order that you may start with the utmost precision and quickness. The second three weeks increase your speed to three-quarters and continue the art of starting, running distances varying from twenty to sixty or seventy yards. The third three weeks increase your speed to seven-eighths, run about one hundred and twenty-five yards, and repeat. After this, run fifty or sixty yards from three to six times. The last three weeks, practice starting several times, and run from fifty to ninety yards and repeat.

If you wish to run a trial, do so at least two or three days before the day of your race. Remember the rule to rest the day before your contest, if possible. Never, under any circumstances, trifle or fool with another athlete while training, because it gets you into a bad habit and you may forget yourself the day of your race.

It usually takes from three to six seasons to learn to run the hundred-yard dash in fast time.

Eleven seconds is fair time, and is very good for persons who are under twenty-one years of age. I have known of a few instances where young men of sixteen, seventeen, eighteen, nineteen and twenty could run somewhat faster than this, their time being, respectively, ten and one-fifth seconds, ten and one-quarter seconds, ten and two-fifths seconds, ten and one-half seconds and ten and three-fifths seconds. It is when young men reach the age of manhood—twenty-one years—as a rule, that they begin to run the hundred yards very fast; and in the great majority of cases they run faster after having attained the age of twenty-three, because growth and development cease at this period of life, after which a greater amount of energy may be manifested in locomotion.

Persons who train for the hundred yards should know something about physiology, and then so many discouragements would not follow, and better sprinters would be the final outcome of athletes who possess not only remarkable speed, but also a wonderful control over their muscles and nerves, as well as other parts of their physiques used in sprinting.

220 YARDS DASH.

This distance requires much more speed than endurance, and although the distance is a very short one, yet it requires more judgment than one would

suppose. Some sprinters are able to run one hundred yards in very fast time, but when it comes to running a distance of twice the length or more they often make a miserable failure. This is because they do not run the distance with good judgment, and after running one hundred and twenty-five yards, one hundred and fifty yards, or one hundred and seventy-five yards, they "go all to pieces." When a sprinter who wishes to run two hundred and twenty yards, finds he has speed enough and lacks staying power, he should run a longer distance, such as two hundred and fifty or three hundred yards, at seven-eighths of his speed, until he has acquired enough endurance. By paying attention to the above, a sprinter will improve markedly, and will be able to run two hundred and twenty yards in much faster time. Some sprinters who are able to run one hundred yards in ten seconds can also run two hundred and twenty yards in twenty-two seconds, but these men are rare, and possess wonderful speed, great endurance, and remarkable judgment, and have trained at intervals from three to six years.

The practical work of training for the two hundred and twenty yards is as follows: spend about three weeks in running three or four hundred yards two or three times daily, at intervals of from ten to thirty minutes, being governed by your feelings as to the time to allow for repeating the distance. Never run so fast during the first three weeks as that you become very stiff. Each day during these weeks pay especial

attention to starting, taking from four to eight starts, but never run over twenty or thirty yards. If you become stiff from starting owing to a lack of judgment either cut the number of starts down, say to two or three a day, or omit them altogether for a while. The second three weeks one may sprint forty, fifty, sixty or seventy yards, from three to five times a day, and run one hundred and fifty yards at three-quarters speed and repeat. The third three weeks let him practice starting about half a dozen times, running twenty, thirty, forty or fifty yards. After this, run two hundred yards and repeat, at about seven-eighths speed. The last three weeks give especial attention to starting, and run the full distance, slowing up toward the end. The order may be reversed if the athlete prefers it; that is, he may run one hundred and fifty yards, two hundred yards, or two hundred and twenty yards, first, and the sprints last; or if he chooses he may change the order on alternate days, *i. e.*, the first day sprint and then run the distance; the second day run the distance and then sprint. By so doing one can relieve himself of the monotony which would follow by sprinting first and then running the distance, daily.

A sprinter, unless under-trained, and even then it is doubtful as to whether it is best, should never exercise the day before a race. This rest of a day will add a great deal of extra strength to his muscles and nerves, and is often not only the very thing necessary for the repair of muscular and nervous tissue, but also

the element which will best aid him in winning his contest.

It requires more speed to run the two hundred and twenty yards than longer distances, because the farther one runs the more nearly do the powers of speed and endurance balance each other, and speed, therefore, is not so requisite as it is in the shorter sprint races, such as the one hundred yards dash, the one hundred and fifty yards dash, and the two hundred and twenty yards dash. Moreover, speed is acquired slowly, while endurance develops much more quickly. The reason endurance is developed more quickly than speed is because there is not so much accuracy required in races calling for endurance. Many athletes develop their powers of endurance long before they acquire any speed, and are able to run long distances in very creditable time, when they are totally unable to make a fair showing in races which require a great deal of speed. Athletes should bear this in mind, and if they learn by experience that their speed is limited, they should not try to run short distances, but confine their training to longer distances. No athlete can tell just how much speed he possesses until he has had three or four years of experience in running. If he shows a fair amount of speed at the outset he may be reasonably sure that he will make a good sprinter. On the other hand, if he is lacking in a fair amount of speed, he had better confine himself to running longer distances. In the latter case he is very likely to be ranked among first-class

athletes, while in the former he will be but a second-rate athlete.

300 YARDS DASH.

This distance is frequently included among the sprint races given by the numerous athletic clubs throughout the United States, Canada and England. Training for three hundred yards does not differ, materially, from the course adopted by the athlete who trains for the two hundred and twenty yards dash. The only real difference which one has to encounter is that he must run eighty yards farther; therefore he must make allowance for quite a bit more endurance than he will find necessary when training for a shorter distance, such as the two hundred and twenty yards dash.

The distances one sprints in practice vary from fifty yards to three hundred, and the regulation of these must be made accordingly. Some men like to sprint two hundred yards when training for the above distance, others two hundred and fifty, or two hundred and seventy-five.

Men who train for three hundred yards should study themselves thoroughly, so as to learn whether their weakness, if they have any, is in speed or endurance, or both. Athletes should also bear in mind that in training for the three hundred yards dash, they may be wasting time by training for a distance which is not suited to them at all.

THE QUARTER-MILE RUN—440 YARDS DASH.

This distance, owing to the fact that it is rather short, is classified among the sprints, and therefore requires more speed than endurance. Nearly every person who trains faithfully can learn to run a quarter of a mile in a minute (60 sec.), but there are very few persons who ever learn to run this distance in forty-eight seconds (48 sec.), or better. Mr. Lawrence E. Myers ran it in forty-eight and one-quarter seconds (48¼ sec.). Mr. Wendell Baker of Harvard College, who holds the world's record, ran the distance in forty-seven and three-quarters seconds (47¾ sec.). Mr. Walter Dohm, of Princeton College, ran this distance in forty-nine and one-fifth seconds (49 1-5 sec.). Mr. Downs, of Harvard College, also ran it in the neighborhood of forty-nine seconds (49 sec.). Mr. Phillips, of Oxford, England, ran the distance in forty-nine seconds (49 sec.), and numerous others have run it in fifty seconds.

Speed is a quality that seems to be a gift to some athletes, and is apparently born in them ; yet one may cultivate speed by practice ; however, it sometimes takes from four to eight years before this is thoroughly developed. Speed depends chiefly upon nervous energy, and the more grit one has the sooner will speed be developed. The one great trouble with all men who train for sprint racing is the fact that they become discouraged because speed does not manifest itself to any great extent in less than from three to five years, and few men have the patience and perseverance to be sat-

isfied with a slow improvement in this respect. They all wish to be able to run at a phenomenal rate of speed in a few months. Such a thing is impossible, and is absolutely unreasonable, because the nerves can not be educated to the work thoroughly in so short a time.

When an athlete starts to train for the quarter-mile run he should begin slowly, and gradually increase his speed. After three weeks he may begin to sprint two or three hundred yards at about three-quarters speed; and after he has rested sufficiently, which must be governed by the effect the exercise has upon him, let him run fifty to one hundred yards from three to six times. After he has been sprinting for several weeks, he should run one hundred and fifty yards at least once a day for a week, then increase the distance ten yards daily, running at about eight-ninths of his speed; by so doing he will avoid the danger of becoming stale.

After the distance has been increased to two hundred and twenty yards, if desired, a trial of this distance may be made in order to ascertain whether he is running fast enough for the first two hundred and twenty yards. Should the time be a little too slow, it is best to return to sprinting from fifty to seventy-five or one hundred yards, until the necessary amount of speed is acquired. If the trial of two hundred and twenty yards is satisfactory, the athlete may continue to increase the distance ten yards more each day until three hundred yards has been reached. Now make a trial of this distance and see how your speed compares with the

time desired, doing as you did for the two hundred and twenty yards. It is a good plan to rest the day before making a trial.

When three hundred yards has been reached, increase ten yards a day until three hundred and fifty is reached, and then run another trial. Now, increase to four hundred; run the distance once or twice a day; according to your condition, and simply jog the remaining forty yards. Then increase ten yards more a day, and complete the full distance about a week before your race. During the week before the time for your race, run about four hundred or four hundred and ten or twenty yards, and let up the last twenty to forty yards. This will save you for the day of your race.

Previous to your race, lie flat upon your back until you are called, and be careful to avoid foul air and dampness. If it is a clear, warm day no harm will come to you if you lie down on the ground, provided you have a blanket wrapped about you and a dry towel under your head.

Suppose one wishes to run a quarter of a mile in a minute: the first one hundred and ten yards (110 yds.) should be run in fourteen seconds (14 sec.), the second, in fifteen seconds (15 sec.), making the first two hundred and twenty yards in twenty-nine seconds (29 sec.); the third one hundred and ten yards, in fifteen and one-quarter seconds (15¼ sec.), and the last one hundred and ten yards, in fifteen and three-quarters seconds (15¾ sec.), thus completing the quarter in one minute

(60 sec.). If fifty-eight seconds be the standard desired the following schedule may be used: run the first one hundred and ten yards in thirteen seconds (13 sec.), the second one hundred and ten yards in fourteen seconds (14 sec.), thus completing the first two hundred and twenty yards in twenty-seven seconds (27 sec.); the third one hundred and ten yards should be run in fifteen seconds (15 sec.), and the last one hundred and ten in sixteen seconds (16 sec.), completing the distance in fifty-eight seconds (58 sec.).

If fifty-six seconds be the desired standard, use the following plan: run the first one hundred and ten yards in twelve and one-half seconds (12½ sec.), the second one hundred and ten yards in thirteen and one-half seconds (13½ sec.), thus completing the first two hundred and twenty yards, or half the distance, in twenty-six seconds (26 sec.); the third one hundred and ten yards should be run in fourteen and one-half seconds (14½ sec.), and the last one hundred and ten yards in fifteen and one-half seconds (15½ sec.), thus finishing the distance in fifty-six seconds. If fifty-four seconds (54 sec.) be the standard adopted, use the following schedule: run the first one hundred and ten yards in twelve and one-quarter seconds (12¼ sec.), the second in twelve and three-quarters seconds (12¾ sec.), making half the distance in twenty-five seconds (25 sec.); the third in fourteen seconds (14 sec.), and the last in fifteen seconds (15 sec.), thus completing the distance in fifty-four seconds.

The schedule one should use, to run a quarter of a mile in fifty-two seconds, is as follows: the first one hundred and ten yards should be run in twelve seconds (12 sec.), the second in twelve and one-half seconds (12½ sec.), thus completing half the distance in twenty-four and one-half seconds (24½ sec.); the third one hundred and ten should be run in thirteen and one-half seconds (13½ sec.), and the last one hundred and ten in fourteen seconds (14 sec.). This will complete the distance in fifty-two seconds (52 sec.). Should fifty seconds be the standard the following is a good schedule: run the first one hundred and ten yards in eleven and one-half seconds (11½ sec.), the second in twelve seconds (12 sec.), making half the distance in twenty-three and one-half seconds (23½ sec.); the third one hundred and ten yards in thirteen seconds (13 sec.), and the last in thirteen and one-half seconds (13½ sec.), completing the distance in fifty seconds.

Few persons learn to run a quarter of a mile in fifty seconds, but I have mentioned several amateurs who have run it faster, and therefore every quarter-mile runner should try to run it faster than fifty seconds. He must, however, have a great amount of patience, perseverance, and experience. If he possesses these he will attain a very high standard unless there is something in his constitution which will not permit him to run so fast.

To run a quarter of a mile in forty-eight seconds requires wonderful speed, grit, and endurance, and

should an athlete endeavor to make such remarkable time, the following schedule will serve his purpose: run the first one hundred and ten yards in eleven and one-quarter seconds (11¼ sec.), the second in eleven and three-quarters seconds (11¾ sec.), thus running the first two hundred and twenty yards in twenty-three seconds (23 sec.); the third one hundred and ten yards in twelve and a quarter seconds (12¼ sec.), and the last one hundred and ten yards in twelve and three-quarters seconds (12¾ sec.), thus completing the distance in forty-eight seconds.

Should those who train for quarter-mile running find any of the foregoing standards not quite suited to their rate of speed, then they may vary each hundred and ten yards accordingly. Some men have more endurance than speed, while others have more speed than endurance. For the former class, uniform running is usually best, that is to say, these men will run each one hundred and ten yards in about the same time, while the latter class will run the first and second one hundred and ten yards faster than the third and fourth.

A quarter-mile run is one of the prettiest races a person can train for, and it is also one that requires a considerable amount of good judgment. If the athlete has to run his race in heats, he had better run his daily distance twice, unless the work be too severe, and also practice starting and sprinting about fifty yards a few times. He should also, as soon as the pistol has been

fired, remember to endeavor to get near to the inside curve, or pole, as it is called, so as to save as much distance as possible. The man who runs three or four feet from the inside curve always runs a yard or two further than his opponent. This applies to all races where the track is not straight away.

I have seen more than one race lost by ignorance of this fact, or by neglecting it when known.

QUARTER-MILE RELAY RACE—440 YARDS.

This is a race which has, recently, been included among the track events. It is such a beautiful race, and at the same time so exciting, that it is extremely popular. The race, as its name implies, is one consisting of relays, composed of four men, who represent some athletic club, and constitute what is known as a team. The team runs a mile, each athlete running a quarter of a mile. The race is started as other races—that is, by report of a pistol. Two men start, one from each team, and as the first one of these finishes the quarter mile, the second member of the same team touches the hand of his colleague and starts for the second quarter. As he finishes, the third member of the team touches the hand of the competitor who has finished the second quarter, and is off; and finally the last member starts when the third member has finished the third quarter, immediately upon touching his hand. No member of a team is allowed to start before he has touched the hand of one of the members of the same team.

The training for this race is practically the same as that adopted for ordinary quarter-mile running, but there is a system by which the athletes are chosen to start first, second, third and fourth. This depends upon the speed of each athlete. The best two men of the team are always given the first and last quarter to run, the slower of the two being allotted the first quarter, while the last quarter is run by the best man. The other two men are given the intermediate quarters to run—that is, the second and third.

The object in arranging the men according to the above order is to allow, if possible, the first man to gain some distance over his opponent; then number two of the same team has a better chance to hold his own if his opponent be a little better runner, because there will be some distance gained by number one, which will allow number two to start sooner than number two of the opposing team; and, in addition, should it prove that number two has been able to increase the lead gained by number one, then number three has a still greater advantage, and should he not be able to retain the lead which numbers one and two have gained for him, he may be able to finish at least a yard or two either in front or behind his adversary; and when number four takes up the running for the last quarter, since he is the best man, the chances for winning are very good. This is the best plan for teams when running quarter-mile relay races, for thus a better average of time is made than by any other method.

THREE-EIGHTHS OF A MILE—660 YARDS RUN.

Running this distance is usually very easy when one is able to run a quarter of a mile well. Some athletes are able to run a quarter of a mile in good time, but they cannot run six hundred and sixty yards so well as would be expected from their ability to run a shorter distance. The explanation for this is that they either do not like the distance, or do not possess sufficient strength of constitution and endurance to run it.

My advice to such men is to be satisfied with running a distance which is both suited to their taste and in accord with their bodily powers.

The distance of six hundred and sixty yards is not often included among the events of track athletics, and hence it is not wise to make a specialty of running it, because one will not be repaid for the time he spends training for it.

Athletes who are quarter-mile runners, by varying their work and distance, soon learn, as a rule, to run six hundred and sixty yards well. An athlete who is in good condition to run a quarter of a mile can run six hundred and sixty yards very well by allowing a week or two to get accustomed to the distance and the extra amount of endurance required. This easily may be accomplished in the following manner: the athlete should run seven or eight hundred yards, if he needs a trifle more endurance, for six or seven days. Each day, he should also practice sprint running, regulating the distance according to the best of his judgment. Some

athletes will find that they must give special attention to sprinting from fifty to one hundred and fifty yards daily; others that it is better to sprint a longer distance.

If the athlete is a good quarter-mile runner he may increase his distance from twenty-five to fifty yards each day. He should adopt a standard of time for the different distances, such as four hundred and fifty yards, five hundred yards, five hundred and twenty-five yards, five hundred and fifty yards. By doing this he can judge his pace very accurately, and in a few days learn whether he is lacking in speed or in endurance, and can train accordingly. If it be the former he should give more time to sprinting, while if it be the latter he should run a longer distance.

Athletes who are good quarter-mile runners frequently make the mistake of attempting to run six hundred and sixty yards at their quarter-mile gait, and they soon learn that they have made a gross error in judgment, being compelled to give up the pace shortly after finishing the quarter-mile. This should be borne in mind by quarter-mile runners who attempt to run six hundred and sixty yards, or they will learn that they have run themselves off their legs before they are aware of it.

All athletes who run six hundred and sixty yards, even if well trained for other distances, will find it to their advantage to give a little extra attention to preparation before competing, in order to become accustomed to the distance.

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If an athlete, who is a good quarter-mile runner, entered for the six hundred and sixty yards without especial preparation, will use his judgment for a moment, he will find it is far the best plan to allow the other competitors to set the pace; because he can then follow them, and being well trained for a shorter sprint race will, as a rule, have no difficulty in out-sprinting the others at the finish. Further than this, he will use better judgment by following his opponents than by leading them. If the athlete possesses the best of judgment as to his pace and endurance he may either lead or follow, because he will run as fast as he can.

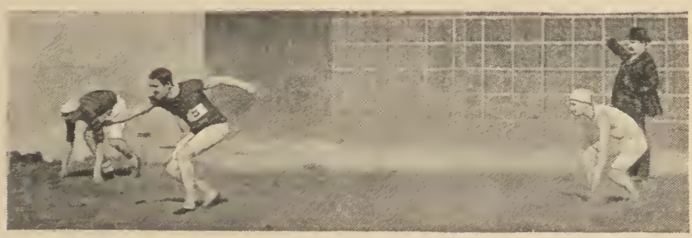
It is no easy matter for the great majority of athletes to tell whether it is better to lead or to follow; and unless one is extremely level-headed he will find it better to follow his opponents than to lead them, especially if he is a good sprinter.

Suppose an athlete wishes to train so that he may be able to run six hundred and sixty yards in one minute and thirty seconds (1 min. 30 sec.). He should run the first two hundred and twenty yards in twenty-nine seconds (29 sec.), the second two hundred and twenty yards in thirty seconds (30 sec.), and the last two hundred and twenty yards in thirty-one seconds (31 sec.). If the standard be one minute and twenty-five seconds (1 min. 25 sec.), the following plan should be adopted: run the first two hundred and twenty yards in twenty-seven and one-half seconds (27½ sec.), the second two hundred and twenty yards in twenty-eight and

one-half seconds (28½ sec.), and the last two hundred and twenty yards in twenty-nine seconds (29 sec.).

If an athlete desires to run this distance in faster time he should adopt a standard for each two hundred and twenty yards accordingly, being careful not to overtrain by endeavoring to reach a standard that is beyond his ability.

Athletes who have more endurance than speed should run each two hundred and twenty yards at a uniform rate of speed, because if they run too slowly at first they will be beaten in the vast majority of cases by athletes who possess less endurance but more speed. No athlete who has but a fair amount of speed should run a "waiting race" when he possesses good endurance, lest he be out-sprinted at the finish.



CHAPTER XV.

Middle Distances.

880 YARDS RUN—THE HALF MILE.

THIS distance requires not only a fair amount of endurance but also a certain amount of speed. It differs from the mile run in demanding more speed from the athlete, the mile run requiring more endurance.

An athlete who can run a half mile in two minutes and fifteen seconds can usually run a mile in about five minutes. This is not always the case, because some athletes have not the endurance to run a mile, while they do possess the necessary amount of endurance to run a half mile really well. When they attempt to run any distance beyond half a mile, they lose their endurance and speed.

Half-mile runners are often defeated by trying to run a distance which is not suited to their strength of constitution, speed, and endurance. Many a good half-mile runner has ruined his chances by training for the wrong event—in fact, this applies not only to half-mile running but to all sports. Athletes should make a very close study of the event they train for.

A good trainer will soon find the right one and guide his pupil properly.

When an athlete desires to run a half mile in two minutes and fifteen seconds, he should run the first two hundred and twenty yards in thirty-one and one-half seconds (31½ sec.), the second two hundred and twenty yards in thirty-three and one-half seconds (33½ sec.), thus completing the first quarter of a mile in one minute and five seconds (65 sec.); the third two hundred and twenty yards in thirty-four and one-half seconds (34½ sec.), and the last two hundred and twenty yards in thirty-five and one-half seconds (35½ sec.), thus completing the half mile in two minutes and fifteen seconds (2 min. 15 sec.). Two minutes and fifteen seconds will seem very fast to beginners, and some will think they can never run a half mile so fast, but I can assure you, if you train for twelve weeks, conscientiously and under the advice of a good trainer, you will be able to run a half mile in the above time and may run a great deal faster. Don't be too anxious to improve. It will come if you only have patience, perseverance, and daily practice.

To run a half mile in two minutes and ten seconds (2 min. 10 sec.), the following schedule should be adopted: the first two hundred and twenty yards should be run in thirty seconds (30 sec.), the second two hundred and twenty yards in thirty-two seconds (32 sec.), thus running the first quarter of a mile in one minute and two seconds (1 min. 2 sec.); the third

two hundred and twenty yards should be run in thirty-three seconds (33 sec.), and the last two hundred and twenty yards in thirty-five seconds (35 sec.), completing the half mile in two minutes and ten seconds (2 min. 10 sec.).

If the standard be two minutes and five seconds (2 min. 5 sec.), the following plan may be used: run the first two hundred and twenty yards in twenty-nine seconds (29 sec.), the second two hundred and twenty yards in thirty-one seconds (31 sec.), finishing the first quarter in exactly one minute (60 sec.); run the third two hundred and twenty yards in thirty-two seconds (32 sec.), and the last two hundred and twenty yards in thirty-three seconds (33 sec.), completing the half mile in two minutes and five seconds (2 min. 5 sec).

When the athlete who is training for the half-mile run wishes to run the distance in two minutes (2 min.), each two hundred and twenty yards should be run as follows: the first in twenty-eight seconds (28 sec.), the second in twenty-nine seconds (29 sec.), the third in thirty-one seconds (31 sec.), and the last in thirty-two seconds (32 sec.), completing the half mile in two minutes (2 min.).

Should it be desired to run from one to six seconds faster, each two hundred and twenty yards should be run just as much faster as will be required to reach the standard.

To attain such excellent qualities of speed and endurance as those called for by running a half mile

in two minutes or better, will require from three to six years of faithful training, at least twice a year for three months each. I can assure my readers that the athletes who are able to run so fast are usually found among men who have been running for a number of years. Occasionally a man is able to run very fast in a year or two, but this is the exception, and if we look further into his history we shall find that he has been practicing running from early boyhood, by playing games, such as baseball, football, lacrosse and shinney, which necessitate a great deal of running.

1,000 YARDS RUN.

This distance bears about the same relation to the half mile that six hundred and sixty yards bears to the quarter mile ; that is to say, the training is practically the same as required for the half mile, allowing a slight variance, as to endurance, for the extra one hundred and twenty yards.

The pace must be regulated as in half-mile running, being careful to allow a sufficient margin for staying power, so that the athlete may be able to finish the extra distance at a fair rate of speed. Half-mile runners attempt to run a thousand yards, thinking that it is not necessary to give any extra attention to the distance, and they usually find they are absolutely incompetent to judge their pace with any self-reliance or accuracy. It takes a few trials to be able to run a thousand yards well, after training for the half mile,

and, unless the athlete has a wonderful gift in judging pace, he will find it to his advantage to spend a week or two in acquiring this knowledge after he is in prime condition for running the half mile.

Twelve weeks should be allowed for training, but if one has trained for a shorter distance and is in good condition, from one to three weeks extra will be sufficient.

The athlete who trains for running a thousand yards should fix a given standard of time, and then train for that distance by educating himself to a pace which will accomplish the distance in the time adopted. Suppose the standard to be reached should be two minutes and eighteen seconds. The first quarter of a mile should be run in about one minute (60 sec.), the half mile should be run in two minutes and two or three seconds, allowing fifteen or sixteen seconds for the remaining one hundred and twenty yards. Should the time adopted, as a standard, be faster or slower than two minutes and eighteen seconds, then the quarter and half mile must be regulated accordingly.

A race of a thousand yards is one that is not run very often, and does not seem to be so popular as the half-mile run. It is deserving of a permanent place in the list of track athletics, because it differentiates between athletes who are capable of running this distance well and those who are first-class half-mile runners. Lon Myers was an athlete among athletes, and was one of the few men who could run well every dis-

tance they attempted, yet he fell far short of his usual brilliant running when he attempted to cover any distance beyond a thousand yards.

1,760 yards run—the mile.

Running one mile requires not only excellent judgment, keen, quick thought, confidence, composure, hard, conscientious training, patience and perseverance, but also a good wind, strong heart and nerves, and an abundance of endurance in conjunction with a fair amount of speed.

When training for the mile run, if strict attention be paid to pace, one can teach himself to judge it within a half a second or a second of the time required for running each quarter of a mile. I have seen athletes so well trained that they could judge their pace within a quarter of a second of the time for the mile. The knowledge gained by being able to judge pace well is the very means of winning many a contest; and further than this, it keeps athletes from being carried along at a faster pace than they can continue for the whole distance, by men who enter contests for the sole purpose of running you faster than you can go, or, in other words, running you "off your feet," as it is called. Competitors who go into contests for this purpose never run the whole distance.

The twelve weeks one gives to training for a mile should be used as follows: the first three the athlete may jog a couple of miles a day at about a seven or

eight-minute gait for each mile. After finishing this distance he should walk about half a mile in order to cool off somewhat and to allow the heart-beats and respirations to become normal.

Second three weeks reduce the distance to a mile and a half, but increase the speed a little so that the whole distance is covered in about nine minutes.

Third three weeks increase your speed so as to accomplish the distance of a mile and a half in eight minutes and a half or better.

Last three weeks run three-quarters of a mile each day at from three-fourths to seven-eighths speed; take a rest afterward, and practice sprinting from fifty to one hundred yards from two to six or eight times, according to your feelings. If you feel tired after having sprinted the distance do not repeat it. Or you may alternate by sprinting a hundred yards one day, the next day run fifty yards from three to six times, the third day run one hundred and fifty yards once, the next run two hundred and twenty yards, and the next three hundred yards, and then begin over.

A little sprinting may be indulged in after the first three weeks of training, if desired, but if done earlier than this it is liable to make one very stiff.

If you wish to reduce your weight wear a heavy "sweater."

Never run to your utmost limit except in a race, unless you are desirous of running a trial, in which case run the full mile. It is best to run your trial on

Saturday, because you have Sunday to rest, by making it a rule never to train on Sunday. If you have a raee on Saturday, run your trial on the previous Monday or Tuesday, take moderate exercise on Wednesday, do little or nothing on Thursday, then rest till Saturday. If you feel that you need it, rest two or three days before your raee.

It will usually take a person from four to eight years, training spring and fall, to learn to run a mile in very fast time, that is between 4 min. 20 sec. and 4 min. 40 sec. Do not get discouraged when you first begin to run if you eannot run fast. If you have the perseveranee, by practice you will gradually improve, and may reach the above standard.

Should it be desired to run a mile in five minutes each quarter should be run aceording to a given standard: the first quarter should be run in about one minute and ten seconds (1 min. 10 see.), the second quarter in one minute and fourteen seeonds (1 min. 14 sec.), thus running the half in two minutes and twenty-four seconds (2 min. 24 see.); the third quarter in one minute and seventeen seeonds, making the three quarters of a mile in three minutes and forty-one seconds (3 min. 41 sec.), leaving one minute and nineteen seconds (1 min. 19 see.) to finish the last quarter. The first half mile may be run a little faster if desired, and the last half a little slower; or if the person has good staying power the halves may be run alike. The variance must be regulated by one's judgment and the amount

of speed he possesses. A mile runner who is capable of running a hundred yards in ten and three-quarters seeonds, or eleven seeonds, need have no fear of being out-sprinted by another eompetitor in the last hundred yards, in the great majority of races, unless the pace has been too fast for him at first. Few mile runners ean run a hundred yards in the time I have mentioned, and during my whole experience of ten years I never met a single mile runner who eould sprint a hundred yards in ten and three-quarters seeonds (10¾ sec.).

Should one be striving to run a mile in four minutes and fifty seconds the time for eaeh quarter should eorrespond to the following: first quarter one minute and eight seeonds (1 min. 8 see.), seeond quarter one minute and eleven seeonds (1 min. 11 see.), finishing the half mile in two minutes and nineteen seconds (2 min. 19 sec.); the third quarter in one minute and fourteen seconds, making the three-quarters in three minutes and thirty-three seeonds (3 min. 33 sec.), and the last quarter in one minute and seventeen seconds, eompleting the mile in four minutes and fifty seconds (4 min. 50 see.).

If four minutes and forty seeonds be the standard the following should be the sehedule: the first quarter of a mile should be run in one minute and four seeonds (1 min. 4 sec.), the second quarter in one minute and eight seconds (1 min. 8 see.), finishing the half mile in two minutes and twelve seeonds (2 min. 12 sec.); the third quarter in one minute and twelve seconds (1 min.

12 sec.), making the three quarters in three minutes and twenty-four seconds (3 min. 24 sec.), and the last quarter in one minute and sixteen seconds (1 min. 16 sec.), completing the mile in four minutes and forty seconds (4 min. 40 sec.).

Should the standard be four minutes and thirty-five seconds each quarter should be run as follows: first quarter in one minute and three seconds (1 min. 3 sec.), the second in one minute and seven seconds (1 min. 7 sec.), finishing the half in two minutes and ten seconds (2 min. 10 sec.); the third quarter in one minute and eleven seconds (1 min. 11 sec.), making the three quarters of a mile in three minutes and twenty-one seconds (3 min. 21 sec.), and the last quarter in one minute and fourteen seconds (1 min. 14 sec.), completing the mile in four minutes and thirty-five seconds (4 min. 35 sec.).

Should the standard be four minutes and thirty seconds, the following schedule should be adopted: first quarter in one minute and two seconds (1 min. 2 sec.), second quarter in one minute and seven seconds (1 min. 7 sec.), finishing the half mile in two minutes and nine seconds (2 min. 9 sec.); the third quarter in one minute and nine seconds (1 min. 9 sec.), making the three quarters in three minutes and eighteen seconds (3 min. 18 sec.), and the last quarter in one minute and twelve seconds (1 min. 12 sec.), completing the mile in four minutes and thirty seconds (4 min. 30 sec.).

If the standard be four minutes and twenty-five seconds, each quarter of a mile should be run as

follows: first quarter in sixty-one seconds (61 sec.), second quarter in sixty-five seconds (65 sec.), making the half mile in two minutes and six seconds (2 min. 6 sec.); the third quarter in sixty-eight seconds (1 min. 8 sec.), making the three quarters in three minutes and fourteen seconds (3 min. 14 sec.), and the last quarter in seventy-one seconds (1 min. 11 sec.), completing the mile in four minutes and twenty-five seconds (4 min. 25 sec.).

If four minutes and twenty seconds is the standard time, run each quarter as follows: first quarter in sixty seconds (60 sec.), second quarter in sixty-four seconds (64 sec.), finishing the half in two minutes and four seconds (2 min. 4 sec.); third quarter in sixty-six seconds (1 min. 6 sec.), making the three quarters in three minutes and ten seconds (3 min. 10 sec.), and the last quarter in seventy seconds (1 min. 10 sec.), thus completing the mile in four minutes and twenty seconds (4 min. 20 sec.).

In the foregoing standards for the different quarters of each mile the variance of half a second or a second is of little consequence, and they may be changed according to the judgment of the athlete.

The fastest mile that has ever been run was done by Mr. W. G. George in his race with Mr. William Cummings at Birmingham, England. Both of these men were Englishmen, and had been training to my knowledge at different periods for six years, and I think I am safe in saying eight years, before the amazing

time of four minutes twelve and three-quarters seconds (4 min. 12¾ sec.) was made. This is the world's record for this distance, and I doubt very much if the time would ever have been made had the two men not been evenly matched, and had they not had the most beautiful weather as well as one of the fastest running tracks in the world to run upon. They were also in the very pink of condition. The different quarters were as follows: first quarter, fifty-eight seconds (58 sec.); second quarter, one minute (60 sec.), making the half mile in one minute and fifty-eight seconds (1 min. 58 sec.); third quarter in one minute and nine seconds (1 min. 9 sec.), making the three-quarters in three minutes and seven seconds (3 min. 7 sec.), and the fourth quarter in sixty-five and three-quarters seconds (1 min. 5¾ sec.), thus completing the mile in the time stated above.

It will be observed that the third quarter was comparatively slow, but the half mile had been run so exceedingly fast that it was absolutely necessary to run the third quarter the slowest, so as to be able to finish the mile, and also to gather together enough strength to run the last quarter in the time they did, to complete the mile with such a remarkable record. Mr. Cummings was beaten about five yards, and he was credited with running the mile in four minutes thirteen and three-quarters seconds, which is also a remarkable performance.

CHAPTER XVI.

Hurdle and Sack Races.

120 YARDS HURDLE RACE.

IN this event the hurdles are three feet six inches high (3 feet 6 in.), and are placed ten yards apart, the first hurdle being ten yards from the starting place or "scratch," and the last, ten yards from the finish. No record should be given for a hurdle race unless the last hurdle is upright. This would prevent athletes from deliberately knocking down hurdles.

A person to be a fast hurdler must be a good sprinter, because it requires speed to make good time in a hurdle race, since the distance is very short.

There is but one correct way to run a hurdle race, and this is called "bucking." By this is meant that the athlete assumes a special position in going over each hurdle. The position assumed is as follows: one leg is drawn directly up and beneath the body, the foot being held slightly toward and behind the opposite leg. The leg that is drawn up, as one springs from the opposite leg, is put out in front of the body sufficiently high to clear the hurdle, and its foot is the one upon which the athlete alights.

The distance between the hurdles should always be run with regularity, and the number of strides should

THE HIGH HURDLE.

be the same. This will teach one to run at a uniform rate, and will also bring the athlete at a proper distance from each hurdle prior to bucking it.

Two great faults found among men who hurdle are, first they judge the distance between the hurdles incorrectly, and in so doing spoil their stride, which interferes with their speed; and secondly, they jump too high into the air when bucking a hurdle, and thus lose time. These faults will frequently make a difference of a second or two when corrected.

When beginning to train for hurdle racing, first learn to buck the hurdle properly; then study your stride until it is the proper length, in order that you may always come to each hurdle correctly. Now combine this with bucking the hurdle, by jumping two, three or four, remembering to jump just high enough to clear each cross-bar. If possible, just touch the top of the cross-bar. After practising this for the first three weeks, add one or two hurdles to the ones you have been jumping, never forgetting to pay especial attention to form; also add to this, sprinting without the hurdles for sixty or seventy yards, five or six times. Continue this during the second three weeks. The third three weeks, practise jumping eight hurdles, and sprint from sixty to eighty or even one hundred yards from two to four or five times. If there should be need for a little more endurance than one possesses, then run two or three hundred yards at about seven-eighths speed for two or three weeks. The last three weeks should

be given to sprinting and jumping all of the hurdles once a day, and especial attention should be paid to standing firmly on the scratch and starting quickly. It takes a great deal of practice and study to run a hurdle race well, upon scientific principles.

If one should have the misfortune to fall during a race, in attempting to jump a hurdle, he should always remember to get under way again as soon as possible, because the same accident is liable to occur to one or all of his competitors at the next hurdle, and in such a case his chances for winning are just as good as those of the other contestants.

I once saw a hurdle race where this occurred, and the competitor had no sooner fallen than he got up and started after the rest, finally overtaking the leading man, who fell at the last hurdle, thus defeating him and winning the race.

Athletes who run hurdle races should know what to do for themselves when they get bruised knees, legs and ankles, and they will find especial reference to the treatment of these ailments in the chapter devoted to sprains, strains and bruises.

Excellent time for the one hundred and twenty yards hurdle race is sixteen seconds, good time seventeen seconds, and fair time eighteen seconds. Should an athlete be under twenty years of age, nineteen seconds is good time and twenty seconds fair time.

When an athlete wishes to be able to run the one hundred and twenty yards hurdle race in twenty sec-

onds he should first learn to jump each hurdle easily and gracefully, endeavoring to cover half of the distance in about ten seconds. He should practice this during the first three weeks of training. The second three weeks, if he be able to run half the distance in ten seconds or better, let him add one hurdle each week, keeping up the same rate of speed, so that at the end of six weeks he is jumping eight hurdles. During the first week of the third period of three weeks, that is the seventh week of training, he should continue to jump eight hurdles, endeavoring to do so with more accuracy and speed. The eighth week of training, add one more hurdle, making nine in all, and keep up the same rate of speed, or increase it if possible. The ninth or last week of the third period of three weeks, add the tenth or last hurdle, and run the full distance, jumping every hurdle, also adding to this the amount of sprinting you deem necessary, never losing track of using keen judgment in this respect, in order not to overtrain and become "stale." The last three weeks pay especial attention to acquiring speed, by sprinting daily. Jump the hurdles each day or each alternate day, being governed by your general feelings. If at any time you feel that you are doing too much jumping over the hurdles, take a rest of a day or two, or even three if necessary.

Especial care should be exercised when one is suffering from a badly bruised knee, a contused ankle, or a strained tendon. It is better to rest in such cases

than to endeavor to overcome the trouble by using liniments, hot or cold water, plasters or bandages.

220 YARDS HURDLE.

This distance requires more endurance than the one hundred and twenty yards hurdle race, but not so much ability to jump, because the hurdles being two feet six inches high are a foot lower than those used in the one hundred and twenty yards hurdle race. Again, the hurdles are placed twenty yards apart, and this allows the athlete more time to recover himself after jumping, and also more time to get under way. Training for this event is similar to that for the one hundred and twenty yards.

The way one should utilize his twelve weeks' training is as follows: the first three weeks run three or four hundred yards at about half speed in order to avoid stiffness, and jump a few hurdles, regulating the length of stride in order to come to each hurdle at a distance just far enough away to jump it without touching it. See that little effort is made to bring you at the proper distance. This can be regulated by putting a piece of white paper at the point where you wish to have your stride bring you prior to bucking the hurdle. After you have acquired the knack of adjusting your strides and jumping the hurdles properly, then do away with the paper and depend solely upon your training, which should teach you to be absolutely accurate as to distance. The second three weeks increase your speed to

three-quarters, and run three or four hundred yards once or twice. Next jump five or six hurdles, take a few starts, and sprint fifty or sixty yards. The third three weeks run about two hundred yards at seven-eighths speed, sprint fifty yards a couple of times and add two or three hurdles, making eight or more hurdles that you are jumping. The last three weeks run the full distance, jumping all the hurdles each day, sprint a couple of hundred yards without the hurdles, and practice starting from three to six times, running about twenty to thirty yards with each start. Care should be taken not to overtax your strength.

First-class time for the two hundred and twenty yards hurdle race is twenty-four and one-half seconds (24½ sec.) ; good time is twenty-five and a half seconds (25½ sec.), and fair time is from twenty-six and one-half seconds (26½ sec.) to twenty-seven seconds (27 sec.). In order to run this race in twenty-seven seconds, the first half of the distance should be run in thirteen seconds, and this rate of speed kept up as well as possible by gradually adding a hurdle or two to the distance, as I have indicated. After jumping the first five hurdles, endeavor to keep up this rate of speed, and add two or three hurdles to the distance. When you have accomplished this, add one or two more, completing the distance. If you have given especial attention to stride and bucking the hurdle, instead of devoting all of your time to speed, you will be surprised to find how easily this can be accomplished.

If twenty-six seconds be the standard to be reached, endeavor to run and jump the first five hurdles in twelve and one-half seconds (12½ sec.), adding the hurdles just as you did when endeavoring to cover the distance in twenty-seven seconds, keeping up the same rate of speed ; and with faithful training you will soon be able to run the distance in twenty-six seconds.

Twenty-five seconds is very fast time for the two hundred and twenty yards hurdle race, and usually takes a couple of years to accomplish, unless the athlete is a phenomenal one. The first half of the distance should be run in twelve seconds (12 sec.), and the distance and hurdles increased as before. Especial attention should be paid to sprinting, because no athlete will be able to run the distance in twenty-five seconds unless he is a very good sprinter.

Twenty-four and one-half seconds is remarkable time for the two hundred and twenty yards hurdle race, yet this can be accomplished. The athlete who accomplishes it will win ninety-nine races out of every hundred he runs, if not one hundred out of one hundred. To run this distance so fast, an athlete must be able to run the hundred yard dash in ten and one-fifth seconds or ten and one-quarter seconds. The first half of the distance must be run in eleven and three-quarters seconds or twelve seconds, and the distance gradually increased with an almost uniform rate of speed, because the athlete has only twelve and a half or twelve and three-quarters seconds to run the last half of the

distance, and this he will find a very hard task. If the athlete be a very strong runner, and one with a maximum amount of staying power, then he may divide the time between the first and second half equally. The great difficulty in the latter case is that most men depend too much on their endurance, and in so doing are apt to misjudge their pace for the two halves in trying to run them exactly alike or nearly so. When the athlete is a good judge of his speed and endurance, then he will be safe; but I warn you, lest you are defeated by misjudging the very thing upon which you depend for victory. More than one athlete has been over-confident, and has been defeated because he misjudged his pace.

SACK RACING.

There is no fixed distance for sack racing, but the method of racing never changes, although the distance may vary. At one time the distance will be fifty yards, and another time it will be one hundred yards, or one hundred and fifty yards. Rarely is it more than one hundred and fifty yards.

The sack is made to envelop the competitor so that nothing but his head is visible. The top of the sack has around it a draw-string, and by means of this the athlete is imprisoned in the sack. He is allowed to grasp the sides of it with his hands. The race is one during which each competitor may either go the whole distance by a series of jumps, or he may

run the whole distance by a series of very small steps. If any competitor wishes to do so he may alternate his manner of locomotion by adopting both means of progression, changing them as he wishes during the race.

It is important in sack racing to see that the draw-string is well fastened about one's neck, in order that the sack may be retained in its proper place throughout the race. It is very annoying to have the draw-string come untied, and such an accident often mars one's chances of winning.

In grasping the sides of the sack, the best way to do so is to take a sufficient amount of material in each hand so as to allow the athlete to twist the material as one would the strands of a rope. This will prevent the hands from slipping, which is a great advantage, and also saves a great deal of valuable time, since there is no necessity for taking a fresh hold of the sack from the beginning to the end of the race.

It frequently happens during sack racing, that one or more competitors will be unfortunate enough to fall. Should this happen to any of my readers he will be greatly benefited by remembering the following point. The moment the athlete is aware that he has lost his balance and is about to fall, he should allow his body to fall in the direction of the goal he is striving to reach. As the body reaches the ground, instead of endeavoring to get up immediately, allow yourself to roll over, endeavoring to roll in such a way that you will bring

yourself upon your feet again. By practice this can be accomplished, and I have seen more than one athlete who could do this so scientifically that he lost practically nothing. It is a good plan to adopt a uniform pace for sack racing, no matter whether one runs or jumps the whole distance. When one has once acquired a uniform method of progression he soon learns to increase his speed and endurance.

The athlete before allowing himself to be put into the sack should examine it closely to see that it is well made. Look for places where it may be poorly sewed, and should you find one or more such places speak to the officials. Be careful to examine the draw-string to ascertain whether it will break easily or not. Also examine the way in which the draw-string has been put through the sack to satisfy yourself that it will not break during the race.

Before starting put the toes of each foot well into a corner of the sack. This will prevent your feet from becoming entangled with other parts of it, provided you exert care in keeping them in the corners.

Begin training for this race by taking a few jumps or runs each day. Here let me say that the fastest way to progress in sack racing is by jumping the whole distance. For those who cannot do this I would advise as much jumping as possible, taking short running steps at such intervals as the competitor thinks best in order to obtain a little rest, which is done by changing the gait.

Allow twelve weeks as in training for other events, but remember that there are additional circumstances to be thought of, which I have already enumerated.

It is a very difficult matter to regulate the pace in sack racing, because the distance is so short that it seems almost impossible to go too fast at the start, but those who are of this opinion will soon learn, by experience, that they are mistaken.

It requires no small amount of judgment and endurance to jump from fifty to one hundred times in succession, without becoming winded and exhausted before finishing the last jump or two. I have seen many a competitor start to jump, in a sack race, at a rate which seemed very slow at first, but much to his surprise he found that after having taken about fifteen or twenty jumps he was becoming very tired, and before he had jumped twenty-five times was compelled to stop altogether.

The same is also true when one runs instead of jumps. The competitor is compelled to take very small steps, and the shortness of these brings on fatigue long before one would imagine ; and many a competitor has found himself overtaken by fatigue much sooner than he had expected, because he made an error judging his pace.

It is best to spend half of the twelve weeks one allows for training for this event in learning to judge pace. The other six weeks may be devoted to increasing the speed of the competitor.

Sack racing is, in nearly every instance, decided in one heat, therefore there is no necessity for training so as to be able to compete more than once. It is almost unknown for two or more competitors to have a dead-heat in sack racing, yet it is not impossible. If you wish to know whether there is to be more than one heat, write to the proper official and ask him to let you know as long before the race as possible; and should there be more than one heat, then train accordingly. A great deal may be gained by taking the above precaution, and you will not be ignorant as to how to train for the race.

When about to start in a sack race do not stand too close to your competitors lest you should, accidentally, be knocked down just as you start. Allow a space of two or three feet to intervene between you and your competitors, and you will thus avoid the danger I have just mentioned.

If during the race you find you have little trouble in keeping up with the best competitors, be satisfied until you are within about fifteen or twenty yards of the finish, and then begin to make your effort, being very careful to maintain your balance. An extreme amount of care should be exerted in this particular, because a fall in the last few yards means almost certain defeat.

SACK RACING OVER HURDLES.

There is but one proper way to train for such an event, and this is by jumping the whole distance. The

length of each jump will depend upon the distance between the hurdles. The competitor should train so that there will be no momentary pause in front of any hurdle prior to his jumping over it. With practice the athlete can become very skillful in jumping over hurdles.

The hurdles are never more than eighteen inches high, and yet with a little carelessness he may strike the hurdle and fall.

I have seen athletes compete in a sack hurdle race, and instead of jumping the whole distance, they would run between the hurdles, make a momentary pause just in front of the hurdle, and then go over it with a jump. So much time is lost in each pause that one is almost sure to be defeated, and where a sack race over hurdles is won once by this method, it will be won a dozen times by using a continuous series of jumps. I have had persons tell me it is easier to run in a sack than to jump, but the difference caused in the loss of time by the momentary pause in the running method is more than compensated for by its absence in the jumping method.

THE MILE WALK.

CHAPTER XVII.

THE MILE WALK.

THIS event is one that requires the athlete to give a great amount of study to the mode of progression, and also necessitates a good control of the movement of the hip joint. The law governing this event compels the competitor to have the heel of one foot and the toe of the other on the ground at the same time. The knee joint is held as nearly rigid as possible while walking, the chief movement being made from the hip, assisted by the upper extremities, which are slightly flexed at the elbow. The right upper extremity is carried forward and slightly obliquely across the chest as the left foot is put out in front of the walker; then the left upper extremity is carried forward and obliquely across the chest as the right foot is advanced in front of the left. The peculiar rotary movement of the hips which all walkers use can best be learned by going to some athletic contest where walkers meet, and observing their mode of walking.

To train for the mile walk begin as follows: spend the first three weeks in acquiring the proper way of walking, never straining yourself or allowing

yourself to work too hard. Walk a couple of miles a day at about a nine-minute or nine-minute-and-a-half gait per mile. The second three weeks walk a mile and a half a little faster, but well within the limit of your powers. The third three weeks spend the first week in walking a fairly fast half-mile, and after sufficient time has elapsed walk from one to two hundred yards at about one-half speed. If you feel like it repeat the distance. The second week of the third three walk five-eighths of a mile and increase your speed slightly; also practice walking two hundred and twenty yards at a little more than half speed for that distance, and repeat if desirable. The last week of the third period of three weeks walk three-quarters of a mile at about three-quarters speed, and sprint-walk a hundred yards once or twice at about seven-eighths speed. The last three weeks spend the first week in walking seven-eighths of a mile at about seven-eighths of your speed, and practice sprint-walking one hundred and twenty-five yards once or twice. The second week of the last three should be spent in walking eight-ninths of a mile at nearly top speed, but never fast enough to cause great fatigue or exhaustion. Also add to this a couple of sprint-walks of one hundred and fifty yards. The last week walk nine-tenths of a mile as fast as you can without exhausting yourself, and take a couple of sprint-walks of two hundred yards. If you feel strong enough afterward, walk fifty yards once or twice, as

fast as you can. Always pay especial attention to walking fairly, so that you may not be disqualified.

SCHEDULE FOR WALKING A MILE IN EIGHT MINUTES.

To walk a mile in eight minutes, spend the first three weeks in getting used to the mode of progression, by walking a couple of miles a day at an ordinary pace, say ten or twelve minutes. The second three weeks spend in endeavoring to learn to walk the first half mile in three minutes and forty-five or fifty seconds. If you wish, walk one or two hundred yards at a very good pace, without exerting yourself to too great an extent. After having accomplished this, begin the third three weeks of your training by walking three-quarters of a mile, and spend the three weeks in teaching yourself to walk three-quarters in about five minutes and forty-five or fifty seconds; add to this, after you have had sufficient rest, two or three sprint-walks of about one hundred yards. The last three weeks increase the distance to seven-eighths of a mile during the first week, continue to walk short distances varying from one to three hundred yards, and repeat them if you feel that there is a necessity for it. During the second week of the last period of three weeks increase the distance to nine-tenths of a mile and walk three hundred yards once at nine-tenths of your speed. The latter part of this week you may make a trial if you wish to know how fast you can walk. During the last week increase your speed to nearly its maximum

and take several sprint-walks of one, two, or three hundred yards. It will be sufficient for most athletes if they walk one of the latter two distances once, especially if they walk as fast as they are able.

SCHEDULE FOR WALKING A MILE IN SEVEN MINUTES AND FIFTY SECONDS.

The training period of twelve weeks should be used as follows: the first three weeks should be devoted to walking a mile and a half or two miles at a fair rate of speed, say from a nine to ten minute gait per mile. Under no conditions should the athlete walk short distances, such as one and two hundred yards, as fast as he is able, during the first three weeks of his training, because he is extremely liable to strain a tendon of one of his muscles which may compel him to cease training for months. He may also rupture the tissues surrounding a joint, and thus be compelled to cease exercising for a long time. The second three weeks should be devoted to increasing his speed, and the distance of a mile and a half or two miles should be continued; this is done to cultivate endurance. The rate of speed, per mile, during the second three weeks should be about eight minutes and thirty seconds. The third three weeks the athlete should devote to speed, and begin by walking a half mile in four minutes, or better, without exerting himself too much. Add to this from one to three sprint-walks of about two hundred yards at seven-eighths speed. If the athlete should prefer to sprint-

walk a quarter of a mile, he may do so. The fourth three weeks should be utilized in the following manner: during the first week of this period walk three-quarters of a mile in five minutes and forty-five seconds, and take a couple of sprint-walks of a hundred yards or so. The second week of this last period extend the distance to seven-eighths of a mile at the same rate of speed, if possible, or try to keep within a couple of seconds of it; continue the sprint-walks of one and two hundred yards, or sprint-walk a quarter of a mile. The last week do light work the first two days; the third day work fairly hard, going the full distance for a trial if you are feeling like it. The next day, fourth day in the week, work lightly if you feel like it; under no circumstances should hard work be indulged in. Now rest from Thursday until Saturday, the day of your race, and you will be able to walk in the allotted time, and perhaps faster, if you have trained faithfully.

SCHEDULE TO BE ADOPTED TO WALK A MILE IN SEVEN MINUTES AND FORTY SECONDS.

Utilize the twelve weeks as above, but make the pace a little faster. After the first three weeks, when the athlete has acquired sufficient endurance, let him begin the second three weeks by walking a mile and a half at an eight minutes and fifteen seconds gait. The third three weeks devote the time to walking fast half miles until you can walk a half mile in three minutes and forty seconds comfortably; take one or two sprint-

walks of one or two hundred yards. After you are able to walk a half mile in the above time, devote the first week of the last period of three weeks to walking three-quarters of a mile, so that you are able to walk the distance in five minutes and thirty-five seconds. The second week of the last three increase the distance to seven-eighths of a mile, endeavoring to keep the same rate of speed, remembering to add a sprint-walk or two after you have had sufficient rest. The last week devote the first two days to walking seven-eighths of a mile at nearly full speed and sprint-walk. The third day walk a trial if you wish, provided you are anxious to know what you can do. If you feel satisfied with your previous work do not walk a trial, but continue the order of the previous day, and after you have finished the seven-eighths of a mile, walk the remainder of the distance at a fair rate of speed so as to go the full distance and at the same time gradually rest yourself. The fourth day walk a fast quarter and take a sprint-walk of about one hundred yards. Then rest till Saturday, the day of your race.

TRAINING SCHEDULE TO WALK A MILE IN SEVEN MINUTES AND THIRTY SECONDS.

Make use of the first three weeks by walking a mile and a half or two miles at an eight minute gait for each mile. At the end of this period begin the second three weeks by increasing your speed so that the mile is walked in seven minutes and fifty seconds. Walk a

mile and an eighth or a mile and a quarter at the same gait, so as to give yourself staying power; add a couple of sprint-walks, regulating the distance between fifty and three hundred yards, according to your feelings. The third three weeks devote to walking fast half miles, covering the distance in three minutes and twenty-five or three minutes and thirty seconds; continue the sprint-walks as before. The fourth three weeks devote the first week to walking three-quarters of a mile, at a little slower gait than you did for the half mile so as not to become winded before you have walked three-quarters. Continue to indulge in the sprint-walks as before. The second week of the last period increase your distance to seven-eighths of a mile, walking the distance somewhat faster than you would if you were going to walk the full mile, but a little slower than you are able to walk seven-eighths of a mile, and add the sprint-walks as usual. The last week of training spend the first day walking a full mile, covering the distance in from three to five or six seconds slower than you can really do when doing your best. When endeavoring to walk a mile in seven minutes and thirty seconds (7 min. 30 sec.), the quarters should be walked about as follows: first quarter in one minute and forty seconds, second quarter in one minute and fifty seconds, third quarter in one minute and fifty-five seconds, and last quarter in two minutes and five seconds. This is merely a general plan, and as no iron-clad rules can be laid down, is subject to

variation according to the strength, speed and endurance of the person training.

TRAINING ROSTER TO WALK A MILE IN SEVEN MINUTES AND TWENTY SECONDS.

Devote the first three weeks to walking a mile and a half or two miles in about eight minutes. The second three weeks should be spent in walking a mile and a half at a seven minutes and forty-five seconds gait, or a seven minutes and fifty seconds gait. The third week should be devoted to walking fast half miles, adding to this a few sprint-walks after resting for fifteen or twenty minutes. The half mile should be walked in three minutes and twenty-five seconds. The last period of three weeks should be used as follows: spend the first week of this period in walking three-quarters of a mile, covering the distance in five minutes and five seconds, and take a few sprint-walks. The next week increase the distance to seven-eighths of a mile, making your speed a trifle slower in order that you may be able to walk the distance without exhausting yourself; continue sprint-walks. The last week walk fifteen-sixteenths of a mile during the first two days and sprint-walk as before. The third day walk a full mile, either making a trial of your ability or keeping within a few seconds of what you can actually do, being governed by your general feelings. The fourth day walk a fast quarter or half mile, and rest the fifth day, thus being ready to compete on the sixth day.

TRAINING ROSTER TO WALK A MILE IN SEVEN MINUTES AND TEN SECONDS.

The first three weeks should be devoted to walking a mile and a half or two miles for endurance, covering the distance at a seven minutes and fifty seconds gait for each mile. The second three weeks increase the speed until the mile is walked in seven minutes and forty seconds. This will require eleven minutes and thirty seconds to walk a mile and a half. A mile and a half will be sufficient to walk at the foregoing rate of speed to give one all the endurance required. The third three weeks should be devoted to walking fast half miles each day, this distance being walked in three minutes and thirty seconds; adding a couple of sprint-walks afterward, when sufficiently rested. During the last three weeks, spend the first week in walking three-quarters of a mile each day and sprint-walk as before. Endeavor to walk the distance in five minutes and forty seconds, or thereabouts. The second week increase the distance to seven-eighths of a mile at about the same rate of speed, and take sprint-walks as before. The third week add a sixteenth of a mile to the seven-eighths, the first two days, and continue to take a couple of sprint-walks. The third day walk a trial if you wish. If you do not wish to do this, walk a full mile, keeping fairly well within your ability. The fourth day walk a fast quarter or half if you feel like it, and rest the fifth day, competing on the sixth. Should you feel a trifle over-trained a couple of days before your

race, do not take exercise of any kind, but lie down in an airy, not draughty, place during the day, and retire an hour earlier than usual even if you cannot go to sleep, in order to get the extra rest of the recumbent posture.

TRAINING ROSTER TO WALK A MILE IN SEVEN MINUTES.

After spending the first three weeks in walking a mile and a half or two miles at a seven-minutes-and-forty-five-seconds gait, begin the second three weeks by walking fast half miles, covering the distance in three minutes and fifteen seconds, and add to this, after resting sufficiently, a couple of sprint-walks. The third three weeks walk three-quarters of a mile, covering the distance in about five minutes, and sprint-walk as before. As to the last three weeks, increase the distance during the first week to seven-eighths of a mile, keeping as much within your time limit of seven minutes for the mile as possible without exhausting yourself. The second week of this last period of three weeks, increase the distance to fifteen-sixteenths of a mile, continuing at about the same rate of speed; take a couple of sprint-walks. The last week devote the first day to walking from twenty to fifty yards more than fifteen-sixteenths of a mile; the second day, increase from twenty to fifty yards more, and the third day, walk the full mile; the fourth day, walk a fast quarter mile, and rest the fifth day, competing on the sixth day.

TRAINING ROSTER TO WALK A MILE IN SIX MINUTES AND FIFTY SECONDS.

Spend the first three weeks in walking a mile and a half or two miles at the rate of seven minutes and forty seconds for each mile, so as to get a certain amount of endurance. The second three weeks make the pace somewhat faster, say about seven minutes and thirty-five seconds for the mile, and walk only one mile and a half. The third three weeks, begin by walking fast half miles each day, covering the distance in three minutes and fifteen seconds (3 min. 15 sec.), and add a few sprint-walks after resting fifteen or twenty minutes. Begin your last period of three weeks by walking three-quarters of a mile, walking the distance at a little slower pace than you have been walking the half mile, but, on the other hand, walking the three-quarters of a mile at a faster rate than you would if going to walk the full mile. The three-quarters should be walked in about four minutes and fifty-five seconds; this will allow one minute and fifty-five seconds to finish the last quarter of a mile, so that the distance may be walked in six minutes and fifty seconds, which should be ample allowance. Continue this for one week, then increase the distance to fifteen-sixteenths of a mile, and walk this distance during the second week, taking a couple of sprint-walks, as before. The last week, walk fifty yards further the first day at about the same rate of speed; the second day, increase fifty yards further and sprint-walk as

before; the third day walk the full mile, but do not take any sprint-walks; the fourth day simply walk a fast quarter of a mile or a fast half mile, according to your feelings. Now rest a day, and you will be in good condition for your race.

TRAINING ROSTER TO WALK A MILE IN SIX MINUTES AND FORTY SECONDS.

Devote the first three weeks to walking a mile and a half or two miles at the rate of seven minutes and thirty seconds per mile. The second three weeks increase the pace a little so that you are walking a mile and a half at a seven minutes and twenty-five seconds gait for the mile. The third three weeks devote to walking fast half miles, and sprint-walks; walking the half mile in three minutes and ten seconds, and one or two hundred yards as fast as you can, always remembering to be careful about straining yourself. The first week of the fourth period of three weeks, walk three-quarters of a mile each day, walking the distance in four minutes and fifty seconds. Continue the sprint-walks as before. The second week of the last period increase the distance to fifteen-sixteenths of a mile at about the same rate of speed, and continue the sprint-walks. The last week of training add fifty yards the first day to the fifteen-sixteenths of a mile, and take your sprint-walks as before; the second day add fifty yards more and continue sprint-walking; the third day walk a full mile, but do not sprint-walk at all;

the fourth day walk a fast quarter mile or half mile, and rest the fifth day, competing on the sixth day.

TRAINING ROSTER TO WALK A MILE IN SIX MINUTES AND THIRTY SECONDS.

Devote the first three weeks to walking a mile and a half or two miles at about a seven minute and thirty seconds gait for each mile or fraction thereof. Begin the second three weeks by walking at a seven minute and fifteen seconds gait for the mile, but instead of walking two miles, walk only a mile and a quarter or a mile and a half. The third three weeks devote to walking fast half miles, walking the distance in three minutes and five seconds. The fourth three weeks, devote the first week to walking three-quarters of a mile, walking this distance in four minutes and forty-five seconds; the second week of this period increase the distance to fifteen-sixteenths of a mile at a trifle slower pace, and take sprint-walks as before. The last week of training increase the distance fifty yards and sprint-walk a couple of times the first day; the second day add fifty yards more and sprint-walk as before: the third day walk a full mile, but do not sprint-walk; the fourth day walk a fast quarter mile or a fast half mile, and rest the fifth day, competing on the sixth day.

I have assumed that an athlete has devoted three or four years to walking when I quote the foregoing "rosters" for walking a mile in seven minutes or less. No athlete will be able to make such remarkable time,

varying from seven minutes to six minutes and thirty seconds, for the mile walk, unless he has been training from three to four years at stated periods. Very few men ever learn to walk a mile under seven minutes, and but one amateur in America has ever walked the distance in less than six minutes and thirty seconds. Mr. Frank P. Murray walked the mile in six minutes twenty-nine and two-fifths seconds, and Mr. William Perkins of England walked it in six minutes and twenty-three seconds, but these records are phenomenal, and are rarely attained even after years of the most faithful training. The athlete who can walk a mile in six minutes and forty seconds will win nine contests out of every ten he enters, provided the event is a "scratch race."

RUNNING BROAD JUMP.

CHAPTER XVIII.

Jumping.

RUNNING BROAD JUMP.

THIS is an event which depends upon the running powers of the athlete as much as, if not more than, upon his jumping ability, because the more speed the jumper possesses the greater impetus will he get in preparing himself prior to jumping. Few athletes attach enough importance to their speed when training for the running broad jump, depending too much upon their power to jump. I have seen one athlete increase the distance from twenty feet to twenty-one feet seven inches, simply by practising short-distance running for six weeks, running from sixty to eighty yards two or three times a day as fast as possible.

The great difficulty all beginners experience, when practising, is in being unable to come accurately to the "take-off," as it is called, with the proper foot, when running at full speed. This can be learned by patience and practice, and when acquired will add a foot or more to one's distance. A great many athletes who train for the running broad jump never study the number and length of strides necessary to bring them exactly to the take-off. If they paid more attention

to these details they would be able to jump much further.

Men who are phenomenal jumpers carefully study stride, speed, and the distance from where they start to the take-off. An athlete who trains for the running broad jump should never run as fast as he can when he first starts, but should begin slowly, and gradually increase his speed so that he will be running at maximum speed by the time he reaches the take-off. In this way he will be able to make a greater effort than if he were to run at full speed throughout the whole distance.

When beginning to train for the running broad jump do not endeavor to jump as far as you can, at first, but allow about three weeks in which to practise form. The second three weeks jump a little further than the first three weeks, and either before or after jumping, sprint from fifty to seventy-five yards. These distances will be somewhat further than you will run when combining the jump, but it is a good plan to run somewhat further so as to develop extra endurance. The third three weeks continue to sprint, and increase your jump a little further. The fourth or last three weeks sprint nearly as fast as you can and jump almost as far as you can, during the first two weeks of the last three. During the one week you have left devote the first two or three days to a few trials; the fourth day take matters easy, jumping and running enough to limber you up, and the day before your contest, rest.

STANDING BROAD JUMP.

If during your practice or in a contest you do not get your stride properly regulated and do not come to the take-off with the proper foot, either stop before you come to the take-off and make another attempt; or if you are running too fast, simply run over the take-off and allow a "balk," as it is called, to be scored against you.

Men who train for this event should be especially careful to "warm up" before contesting, because one is very liable to strain a tendon by neglecting to do so, which may spoil his training for a whole season, and in extreme cases may prevent him from ever doing justice to himself or cause him to give up training.

When competing, scrutinize the bed of dirt into which you are to jump, in order to be sure that you are not exposing yourself to the possibility of being injured by alighting upon a stone or piece of brick which may have been left there. These have caused more than one athlete a source of regret, and have ruined his chances for winning by injuring him to such an extent in his first jump that he was compelled to withdraw from the contest.

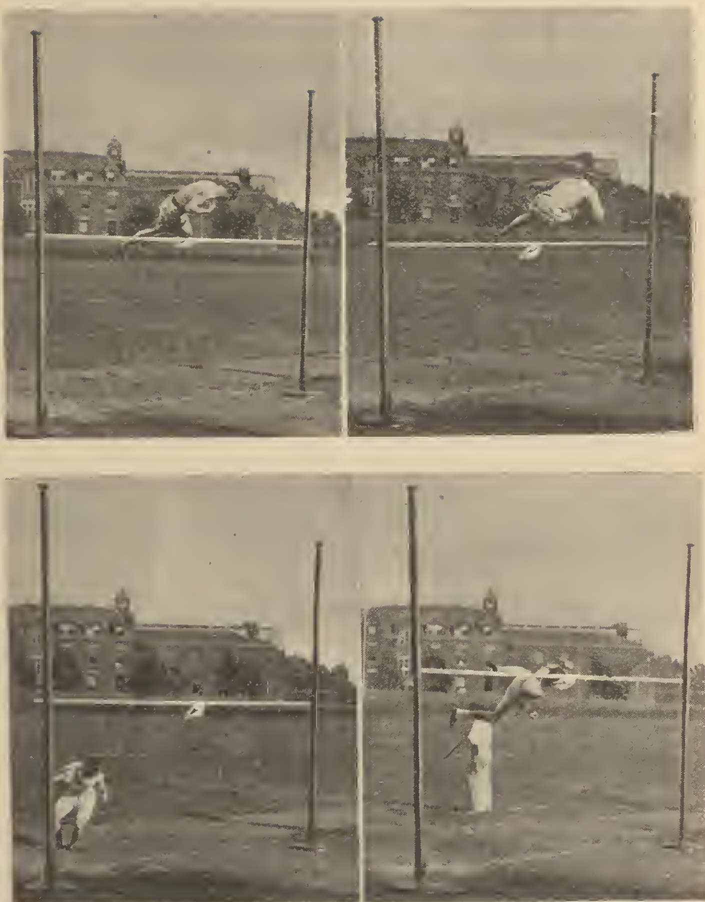
Also see that the board forming the take-off is firmly fixed in the ground in order to protect yourself from the possibility of spraining your ankle. Inspect the ground over which you run prior to coming to the take-off, to see that it is free from stones, pieces of brick, glass, tin, etc. These may be well imbedded in the ground, and therefore you must look carefully and

closely. A great deal of trouble and annoyance will be avoided by remembering the above considerations, and athletes will escape unnecessary exposure which may seem trifling at first sight, but in reality is of paramount importance.

RUNNING HIGH JUMP.

Training for this event is somewhat similar to that for the running broad jump. An extreme amount of accuracy is necessary when going over the cross-bar, and it requires months of active practice to accomplish the knack of doing this well, because the athlete must combine the preliminary run, the effort at raising the body when in the act of jumping, and the rotating or twisting of the body, in order that the cross-bar may not be displaced.

The only scientific way to jump very high is as follows: face the cross-bar, run toward it, gradually increasing your speed so as to be running at full speed when about to make the attempt to jump over it. As the body is sent up toward the bar, the knees should be drawn toward the abdomen, and the feet brought together; then quickly extend the legs when going over the cross-bar, and rotate the body the instant both feet are over the bar, so that the buttocks may not come into contact with it. The jumper should alight facing the bar or nearly so. In other words, in performing the jump one has turned his body half way around. It is extremely difficult at first to combine the run, the



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RUNNING HIGH JUMP.

jump, and the turning of the body, especially the latter two. Especial attention should be paid to turning the body as it is sent over the bar, because the buttocks usually knock the cross bar down. If they clear the cross-bar the athlete will sometimes improve his jumping from two to six inches, provided he can combine his run and jump properly.

The distance between the start and the take-off should be studied carefully so as to bring the proper foot at the right spot in front of the cross-bar before attempting to jump over it. The jumper should be capable of judging this spot perfectly so that he may be able to come to the take-off at full speed, and combine this with his effort at the proper time and place. Neglect of these points makes a great difference in the height one is able to jump, hence it is better to begin slowly and under the advice of some athlete who understands how to tell you what to do and when to do it. Study the methods of the best high jumpers you meet in competition, and if you are patient you will soon acquire a good method of jumping.

Diet is not so essential when training for high jumping as it is for running, but one had better live upon plain, wholesome food.

Begin training as follows: measure the distance between the point at which you start to run and the take-off, which should be far enough in front of the cross-bar to allow you to jump without any danger of displacing it as you raise your body into the air.

See that the ground over which you run is firm and smooth. Now count how many strides it will take to come to the take-off from the starting point, and be sure to remember the number of strides required, also whether you come to the take-off with your right or left foot. If the jumping be done from the right foot see that you start with the proper foot in the beginning, being governed by the number of strides you make in covering the distance. If the number be even, start with the right foot if you jump from the right foot ; if it be odd, start with the left foot in front of you. Should you jump from the left foot instead of the right and the number of strides be even, then start from the left foot ; if the number of strides be odd, start with the right foot first. Be careful not to jump too close to or too far from the cross-bar. By following this plan one soon teaches himself to come to the take-off with perfect accuracy and confidence. After having accomplished this, combine the jump, first starting at the point where you begin running, coming to the take-off at full speed, then leaping over the cross-bar, turning the body as previously directed. The higher the cross-bar is raised the farther from it must the take-off be, and hence the distance of the take off from the cross-bar for each height should also be accurately measured, so that the athlete may become perfectly familiar with the different distances of the take-off as the height to be jumped increases.

As the cross-bar is raised higher and higher, remember that you must get more impetus to send you over. This force can be supplied by being able to run up to the take-off very fast. Never run fast enough to spoil your effort at jumping, but endeavor to combine both the force of speed and the force used in jumping, so as to get a maximum force for your final effort, which is to enable you to clear the cross-bar.

The first three weeks should be spent in sprinting short distances, as one does when training for the hundred-yard dash ; also practice style in jumping. Become thoroughly familiar with the take-off and the method of jumping over the cross-bar. Do not jump very high during this period.

The second three weeks increase the height an inch or two, and your speed in running to the take-off ; remember that form is worth from two to four inches at least, and therefore pay the strictest attention to it.

The third three weeks increase the height gradually without exerting yourself to any great extent, also increase your speed in running to about three-quarters of its maximum.

During last three weeks gradually put the cross-bar within an inch or two of the height that you are able to jump, and practise it from six to twelve times.

Never be afraid to try to jump any height, even if it seems impossible. You will often surprise yourself, if you determine to make a grand effort, by clearing a height an inch or two, or even three, higher than you

have done before, when you least expect it; this may win your contest. Regulate the number of jumps during the twelve weeks you are preparing for your contest according to the way you feel. Three trials at one height are usually sufficient, and since the rule governing running high jumping allows each competitor only three trials at each height until he fails, it is best to accustom one's self to this rule. It is rare to see an athlete jump very high unless he has had from three to five years' training. Improvement is slow, and jumpers who accomplish the feat of jumping six feet or higher do not do it in a day. It took Mr. William Byrd Page about eight years to clear the cross-bar at a height of six feet four inches. From this any athlete will readily see how much patience and perseverance is required to become a phenomenal high jumper. Mr. Sweeney cleared the cross-bar at six feet five and five-eighths inches.

POLE-VAULTING FOR HEIGHT AND DISTANCE.

There are a great many things to be learned before an athlete can become an expert pole-vaulter. The balance, thickness, weight and length of the pole should be studied carefully. The regulation pole is about an inch and a half in diameter, is sixteen feet long, and made from hickory, spruce, oak, pine or ash. Ash is commonly used.

A pole should be well-balanced, and the spike which is inserted in the end that is thrust into the ground

POLE VAULTING FOR HEIGHT

should be firmly held in place after having been driven into the pole, by an iron, steel or brass band, which encircles the pole at the "spike-end." In selecting a pole the grain of the wood should be carefully noticed, and great care should be taken to select one that is free from knots. Care should also be manifested in selecting a pole which contains a fair amount of flexibility, and whose surface is perfectly smooth, so that one may not expose his hands to small splinters.

The athlete who takes up pole-vaulting should be able to vault as well from grass as from a cinder or loam take-off. Mr. C. J. Bucholtz, who held the Inter-Collegiate Championship during the year 1893, was beaten in 1894 simply because he had always been accustomed to vault from a cinder or loam take-off. The reason he was beaten then was because the take-off was from grass, and he had never practiced from such a one. It is best to practice from all kinds of take-offs, so that you may not be troubled.

Always measure the distance from the start to the take-off, so as to judge the length of stride you are to take in your preliminary run toward the cross-bar. Make a point of practising this distance until you feel sure you will not lose your stride. By paying attention to this, accuracy in stride will soon be established, and then you will be able to pay more attention to speed as you approach the bar. Every pole-vaulter should be able to "run up his pole," as it is called; that is, he should get sufficient impetus from his run to send him

up to the cross-bar easily. The great stumbling block with all pole-vaulters is they do not have sufficient courage to run up the pole when the cross-bar is at a height of ten feet or above.

When the cross-bar reaches a fair height, say nine feet six inches, the vaulter is not only required to get a good run, but should be capable of controlling his body while in the air. He should be able to force his lower extremities and the trunk of his body over the bar, and at the same time to rotate the whole body in order to get his buttock as far away from the cross-bar as possible when making an attempt to clear it. To acquire the knack of doing this requires faithful practice, and sometimes three or four years elapse before it is learned. Pole-vaulters in running toward the cross-bar should run upon their toes, just as sprint runners do ; and the faster a pole-vaulter can sprint, the higher will he be able to vault, if he has good control of his body while in the air.

The pole should be carefully examined, each time, before using it, to ascertain that it is free from the slightest crack. Never use a pole which may break with you. In this way you will avoid the possibility of having part of the pole run into your side, leg, arm or head. Accidents of the foregoing kind have occurred to pole-vaulters, and some of them have been very serious, perforating the lungs or rupturing a blood-vessel. Such dangers may be avoided by paying attention to the hints I have thrown out.

No athlete who takes up pole-vaulting should begin with even a medium height. It is far better to begin with a low height, say three or four feet, pay strict attention to form in vaulting, and gradually increase the height, than to start at seven, eight or nine feet and continually endeavor to clear it. Even if one finally is successful in clearing one of the latter heights, all form will be lost, and there will be little or no improvement; while if one starts with what may seem a ridiculously low height, and pays the keenest attention to form, in every detail, the improvement will be marked and rapid.

Especial care should be exercised in regulating the distance between the hands when they grasp the pole. The proper distance is about a foot or a foot and a half. If the hands be further apart than this, the effort at vaulting will be much harder, and the vaulter will find great difficulty in controlling his body.

The pole should be grasped so that both thumbs are up, because a greater height can be reached than by grasping it so that the upper hand has the thumb up. while the lower hand has the thumb down. I have seen vaulters who adopt the former grasp, vault eleven feet and more; but I have yet to see the vaulter who adopts the latter grasp, vault ten feet.

Every athlete who intends to take up pole-vaulting should allow himself twelve weeks to train for his contest, assuming that he is in no condition whatsoever for the sport. Should he be in fair or medium condition, then he must regulate the number of weeks

accordingly. When twelve weeks are allowed, the first three weeks should be spent in giving especial attention to form. Short running should also be indulged in, but under no circumstances should sprint running be begun during the first three weeks. Let the running be moderate as to speed and distance. The second three weeks the height may be increased six inches to a foot, according to the ability of the vaulter, and the running may be increased as to speed. The third three weeks the height may be increased again, and now the vaulter may indulge in sprint running at a pace which calls for about seven-eighths of his speed, practising distances from thirty to fifty yards, according to disposition. From three to six sprints of this sort will usually be sufficient. The last three weeks should be spent in vaulting gradually to a height that is a few inches lower than the maximum height the athlete is capable of vaulting. In this way a certain amount of reserve is left, and in clearing the height easily one gains greater confidence than by attempting to vault as high as possible, and failing to clear the cross-bar.

When a vaulter feels tired after having failed several times at one height, it is better to cease trying, because he is overdoing the matter, and the more frequently he tries the worse will his form become, and the more often will he fail.

If a pole becomes bent after using it, either have it straightened or procure a new one. Not only is the pole liable to be broken, but the competitor using it

will find that the slight bend in the pole necessitates his vaulting an inch or two higher than if it were perfectly straight.

Some athletes practise vaulting over a rope or string. This is a very bad habit to indulge in, for two reasons: first, the rope or string will sag an inch or two in the centre; secondly, they are not so easily displaced, hence the athlete often becomes less accurate when sending himself over one or the other, because he soon learns that he may touch either of them with less danger of displacing it, especially when the lower extremities are well over it. With a wooden cross-bar it is much more difficult to clear a given height, because the bar is more easily displaced; and as the cross-bar in all competitions must be made of wood, it is best to practise vaulting over nothing but such a cross-bar.

Before going into an open competition see that the ground over which you are to take your preliminary run, is free from all small stones, pebbles, pieces of glass, tin, etc. Should you not look to this and encounter one or more of the foregoing, the result may be a sprained ankle or muscle which will necessitate your withdrawing from the contest, thus spoiling your chances, and perhaps cause you to be laid up for weeks and even months. Should a pole-vaulter meet with an accident, such as a sprained wrist, ankle, shoulder or back, it is best for him to cease vaulting until the injured part has had an absolute rest for a period

long enough to allow it to become entirely well. Do not continue to train or enter contests after having received an injury, by endeavoring to make the injured part do its work with the aid of a bandage or plaster. This will not give permanent relief. The injury in nearly every case will become worse instead of better, and you will only be compelled later to rest the part twice as long as you would had you given it absolute rest at first.

All pole-vaulters should also inspect the ground upon which they are to alight. This ground should be well dug up, soft, and free from everything which is a source of danger. The loam should be very fine; not large cakes the size of a spade, which I have frequently seen, and which often cause the vaulter to injure some part of his body. Also scrutinize the wooden piece forming the take-off, so that you may be sure it is firmly held in the ground Should this board be loose it will cause you no end of trouble by causing your pole to slip, bringing it closer to the cross-bar than you wish.

All of the foregoing hints will also apply to pole-vaulting for distance; and the athlete who is a good man when vaulting for height, will find that he can hold his own against other competitors when vaulting for distance. It often happens that one athlete will be able to vault higher than another, while, if we consider the same two when vaulting for distance, the latter will defeat the former; hence we can fairly conclude that,

because one athlete wins from another when vaulting for height, it does not follow that he will also win when vaulting for distance. However, a vaulter may excel both at height and distance.

Pole-vaulters will find it to their advantage, if they teach themselves to balance their body when the pole assumes a perpendicular position in the air. The power to balance, if used only for an instant, often enables the vaulter to get some part of his body away from the cross-bar, which would displace it were he unable to balance himself for this momentary pause; and thus he clears a height which he will often fail to clear when unable to control his balance.

To those who wish to keep themselves in a semi-condition for vaulting, during the winter months, I would say that a gymnasium is a good place for practice; but care should be taken, since more dangers present themselves here than in the open air. In the first place, the run that one takes in the gymnasium prior to vaulting is usually much shorter and upon a board floor where there is more danger of slipping. One should not wear ordinary gymnasium slippers. The best kind of shoe for this purpose, when practising in a gymnasium, is the regulation running shoe, having a rubber sole instead of a leather sole with very short spikes protruding. In the second place, the board into which the spiked end of the pole is to be thrust, should be very firmly secured by means of iron pins, one of which passes through each of the holes in the corners of the

board, and then through a hole in the floor at least two or three inches deep, in which it is secured. In the third place, the point of the spike in the pole should always be very sharp, in order to avoid the least possibility of slipping. Should this occur, there is greater danger of an accident than in the open air, because the board floor is much harder and less elastic than the ground. In the last place, the mats used in gymnasiums are of different thicknesses, and without thought vaulters will often use the thinnest mat in the institution. In so doing they are not only subjecting themselves to great shock when they alight upon it, but are also predisposing themselves to sprains, which may be avoided by using the very thickest mat the place affords. If there are no thick mats in the gymnasium take several thin ones, placing them carefully upon each other, in order to make the surface upon which you intend to alight as smooth as possible. When alighting, either upon the ground or a mat, endeavor to relax every muscle in your body as much as possible; by so doing you can reduce the jar the body would receive if kept rigid. When practising in a gymnasium, be careful to remove all the splinters made by thrusting the pole into the board from which you vault. Thus you will avoid running one or more of these into your arm, leg or body if you slip while attempting to vault. All the dangers I have pointed out have occurred to more than one athlete when vaulting, and it is the best rule to remember that "an ounce of prevention is worth a pound of cure."

THROWING THE HAMMER.

CHAPTER XIX.

THROWING THE SIXTEEN-POUND HAMMER.

THE ground from which the hammer is thrown is encompassed by a circle whose diameter is seven feet. The hammer, including the weight of the handle, is sixteen pounds. There is a great deal of "knack" which an athlete must acquire before he will be able to throw the hammer scientifically. When grasping the hammer for a throw, one should do so as close to the end of the handle as possible, at the same time remembering to take a strong enough grasp to hold the hammer as it is being swung around the head. In preparing for a throw the competitor stands with his back to the piece of wood which forms an arc of the circle in which he is standing, and over which he is forbidden to step under penalty of a foul throw. The hammer is then put at full arm's length from him, his body being nearly at a right angle. A movement is next made which causes the hammer to make a circle around the head. This movement is repeated two or three times, each revolution being increased in velocity until the maximum velocity is attained, when the competitor, at the completion of the

last revolution, turns his body around once or twice, and reaching over the wooden arc, lets go the hammer. Great care and precision are required in doing this, lest the competitor, by making too great an effort, should lose his balance and overstep the circumference of the circle, thus making a foul throw, which counts as a trial against him. With careful practice an athlete can learn to make a tremendous effort without any danger of making a foul throw. The chief thing to be remembered is to control the muscles of the body in regular sequence : first, the arms as they swing the hammer; then the trunk of the body as the force made by swinging the hammer is transmitted to it; and lastly the legs, which maintain the body in a state of equilibrium as the arms and body work in unison. After one has allowed the hammer to leave his grasp, he should teach himself to recover as quickly as possible ; by so doing he will not expose himself to the danger of overstepping the circumference of the circle in which he is confined.

Hammer-throwers as a rule are more anxious to see how far they can throw the hammer than to pay strict attention to the method of throwing. When more attention is given to method and less to distance the result is better. Here let me add that such men as Messrs. Gray, Mitchell and Queckburner, of the New York Athletic, Hickok of Yale, Edgren of the University of California, and Woodruff of the University of Pennsylvania, all adopt the same plan of throwing

the hammer, which is the method I have given. These men are well known, have excellent records, and some of them have held the amateur championship of America at different times. Hammer-throwers, like all other athletes, will find that to be able to throw a hammer a great distance, such as a hundred and thirty-five or forty feet, requires patient training and constant practice. There are cases where athletes have been able to accomplish the above distance in a comparatively short time, but it is the great exception to find such an athlete. If one endeavors to solve the reason for it, he will find that some previous occupation or exercise has developed the muscles used in throwing the hammer, and the individual is possessed of wonderful control of these muscular groups.

In the United States, hammer-throwing has improved greatly, especially among amateurs who are members of the different athletic clubs throughout the country, and among the college athletes in our different universities and colleges. One can trace this to the fact that more scientific knowledge has developed in physical culture, and greater care and attention have been paid to the sport during the last ten years.

Hammer-throwing is one of the prettiest field sports one would wish to see, especially when two or three muscular giants are competing against one another for the championship of their country. Here, as in other sports, about twelve weeks should be allowed for training. The first three weeks should be spent in taking

general exercise, such as running, jumping rope, using light dumb-bells, and throwing the hammer a few times daily for form, not for distance. The second three weeks one may increase the distance a little, but never to such an extent that form is lost, continuing the dumb-bells, running, etc. The third three weeks increase the distance a trifle more, but do not exert yourself to your utmost, and continue the exercises prescribed during the first six weeks. The last three weeks try to throw the hammer within a few feet of your utmost effort, but do this only about five or six times, and continue the other exercises as usual.

Under no conditions should you allow yourself to practise until you are utterly worn out. This will not only lead to your growing "stale," but there will also be great danger of straining the overtaxed muscles, and should this occur, you will find no cure for it but absolute rest. Before making an attempt to throw the hammer, see to it that every muscle in the body has been well warmed by some light exercise, or still better, a thorough rubbing. Muscular tissue, under ordinary conditions, does not act so well as when gently warmed; therefore the hammer-thrower who throws a hammer without paying attention to the above fact is only handicapping himself to a great extent, and frequently loses his competition from neglect, when he might otherwise have won. Little hints may appear trifling to some, but the wise athlete is the one who is always willing to learn, and it is often the

PUTTING THE SHOT.

knowledge of little things that enables him to become a champion.

Hammer-throwers should be very careful to develop the muscles which surround and control the movements of the shoulder-joint. This joint has surrounding it several very small muscles, and unless their development is gradual, there is great liability to strain them. I have known cases of this kind which necessitated the abandoning of the sport altogether. These small muscles may be developed by rotating the upper extremities both forward and backward either with or without apparatus. It is a very good plan to keep these muscles in fair condition during the whole year by some light work in the gymnasium, exerting a little precaution in regard to overworking them.

PUTTING THE SIXTEEN-POUND SHOT.

It has been contended by some that it is much more difficult to put the shot than to throw the hammer. Whether this is true or not is difficult to say, because there are just as many hammer-throwers who contend that it is more difficult to throw the hammer. Strange as these assertions may seem—and I have no doubt that the shot-putters and hammer-throwers who believe such to be the case are fully convinced that they are right—yet we are comforted with the fact that there are many men who can both throw the hammer and put the shot equally well. From my experience with these athletes, I am inclined to think that if

an athlete can throw a hammer well, he can also put a shot well; and I have seen but one case where a man could throw the hammer one hundred and twenty-five feet, while if he tried to put the shot he succeeded in sending the sphere only a little over thirty-two feet. My belief in his ability to put the shot was much greater than his own, and I always felt that had he liked shot-putting as much as he did hammer-throwing and had given as much time to it, he would in a short time have been able to put forty feet. I remember a second instance where the case was just the reverse. The athlete held the Inter-Collegiate Championship, having won it with a put of about thirty-nine feet, yet this man could not throw the hammer much over seventy feet.

The method of putting the shot is very difficult to most beginners, yet athletes who are able to make a put of forty feet or more adopt the same general style. The method of putting the shot, just as in hammer-throwing, requires practice to become expert, and it is only the phenomenal athlete who acquires the knack in a short time.

The circle in which the competitor is required to stand has the same diameter as that required when throwing the hammer, and in fact is the same in every respect. While I shall explain in detail the method of putting the shot, yet I would advise every one who contemplates training for shot-putting to get an expert shot-putter to show him the method in person, because much valuable time will be saved in learning each

point correctly. For the following description I feel indebted to Messrs. Gray and Mitchell, having studied both carefully when putting the shot.

The shot is held in the right hand, the athlete standing with his right foot close to the line forming the circle, occupying a position directly opposite to the centre of the wooden arc described before. The shoulder is thrown well back, and the forearm is flexed upon the arm. The hand is slightly extended by the weight of the shot. The left foot is about a foot or two in front of the right, so as to balance the body properly. The whole body is nearly at right angles to the centre of the wooden arc, never facing it. The head may be made to face the arc, so as to judge the distance when making an attempt to put the shot. The athlete, while in this position, extends the left arm at right angles to his body, makes a slight motion or two by elevating the foremost foot a sufficient height to maintain his balance, then quickly hops forward with the right foot about three feet and a half, turns so as to face the opposite direction, puts the left foot on the ground and extends the right arm vigorously as the right foot touches the ground. Should the athlete be left-handed, the position and method should be reversed.

Training for shot-putting does not bring the respiratory power into play; however, it is a good general plan to take some auxiliary exercise for the lungs, because by so doing the muscles which cover the chest are developed and strengthened, and in this way the athlete

acquires more control over these muscles. The period of time should be twelve weeks, as in other events. The first three should be spent in taking gentle exercise, consisting of running short distances, such as two or three hundred yards, light dumb-bell drills, club-swinging, etc. Club-swinging teaches one to be very accurate and is of great assistance to those who train for shot-putting, not only on account of the accuracy the athlete acquires, but also owing to the fact that it develops all the muscles about the shoulder joint, arm and fore-arm. One should also put the shot for form, not for distance, during the first three weeks. The second three weeks make the above exercise a little more severe, and increase the distance of putting the shot. The third three weeks make the exercise still more severe, and again increase the distance of putting the shot. The fourth three weeks, exercise so that the work causes a fair amount of fatigue. During the twelve weeks of training never put the shot so often that it causes muscular exhaustion. From six to twelve times a day will usually be found sufficient.

Should the athlete who is a novice at shot-putting have difficulty in controlling a sixteen-pound shot at first, let him practice with a twelve-pound one until he has acquired the art of putting it in good form. After this has once been learned it will be easier to handle the sixteen-pound shot, though of course there will be a little difficulty at first, and the distance the athlete is able to put the shot will be much less. If necessary,

continue practising with the lighter shot until your method of putting it is perfect. Never try a few puts with the twelve-pound shot, and then return to the sixteen-pound before good form has been acquired; by so doing you are liable to spoil your way of putting the shot altogether. After one has once become well versed in the art of putting the shot he never loses it. The only precaution necessary to take is not to endeavor to put it as far as possible, nor try to equal a former record, when the muscles are not well trained and able to do the work required. A disregard of this will often produce a strain or sprain which may cause no end of trouble.

The art of putting the shot does not depend absolutely upon the muscular strength of the athlete. A man who possesses the muscular strength of a Hercules may, and often does, find that he is unable to put the shot further than thirty or thirty-two feet, when he expected to put it at least forty, and he wonders why such is the case. This is very easily explained when one understands anatomy and physiology. The muscles being governed by nerves and the nerves by the spinal cord and brain, it is necessary for all of these different parts of the body to work in harmony in order to co-ordinate the movement perfectly. Not having been trained to do this the muscular giant loses a great deal of force, due to a want of co-ordination of movement, and the shot falls at thirty or thirty-two feet instead of being put farther.

The athlete who is well drilled will in ninety-nine cases out of one hundred put the shot a greater distance than his adversary who may possess twice the amount of muscular strength but who is not well drilled. Let me add that no two athletes who are novices will, as a rule, improve at the same rate in the same period of time. This is simply because they are born different, and no athlete should be discouraged because he does not improve so rapidly as his neighbor. Be patient, faithful, and persevering, and in the long run you may be able to compete with the best shot-putters in the world. My advice to men who are possessed of small muscles is not to train for putting the shot, because it rarely happens that such a one is ever able to become a champion at this event. He may do very well, but would better take up some other athletic sport in which he may be able to win a championship. Men who are of spare build usually do much better by running; on the other hand, it is a rare thing to see a man with tremendous muscles run very fast. Such a thing has been known, but it does not often occur. Men who are muscular giants do far better in shot-putting or hammer-throwing than they do in running. Queckberner, who was very expert with the shot and hammer, could run fairly well. Mr. William B. Curtis, who could not run very fast, was one of the best heavy-weight men of his day. I quote these two examples simply to illustrate the difference in the peculiar capabilities of men in general.

When making an attempt to put the shot be careful to do so, well from the shoulder, so as to get all the force possible out of your arm and shoulder as you extend your arm and fore-arm. A mistake, very commonly made by those who train for shot-putting, and especially by novices, is that they devote too much time to shot-putting, and not enough in endeavoring to develop their body in a symmetrical manner. Frequently an over-development of the side and upper extremity used in shot-putting, retards rather than increases the improvement of the athlete. This is because the shot-putter finds it difficult to maintain his balance when preparing to make his effort. The difference in development between the right and left arm and right and left side will frequently amount to three, four or five pounds; hence it is no wonder the athlete must exert more care and energy to keep his balance while in the preliminary position. The right arm and side have a great deal to do with the ability one possesses in putting the shot if the person be right-handed, and the same is true when the shot is put with the left hand; but the extremity which acts as a balancing agent also plays a very important part, and therefore there is just as much necessity for developing it as there is for developing the opposite member. If athletes in general only knew the importance of this point they would depend more upon symmetry than on abnormally large muscles, which frequently handicap a competitor to such an extent that he is defeated.

THROWING FIFTY-SIX-POUND WEIGHT.

This event requires a great deal of muscular strength, and only those who possess it should undertake to throw the weight. It is useless for an athlete to train for this event when he is perfectly sure of being beaten, because he is attempting to do something which is entirely beyond his powers. An athlete to be an expert weight-thrower must have exceptionally well-developed arms and back, in addition to possessing sufficient muscular development about his chest and legs to do the work called from the muscles in these regions. The best weight-throwers are men who are far above the average in muscular development, and these men might well be classed as muscular giants. When I recall such men as Mitchell, Curtis, Queckberner, Gray, Hickok and others, I think of their powerful muscular systems, and then say to myself how many athletes there are who are wasting time by attempting to accomplish what these men have done.

Men who are not muscular giants are in great danger of straining their muscles by attempting to throw the fifty-six-pound weight.

Many ways exist of throwing the fifty-six-pound weight. One method is to stand with the back of the heels touching a beam which is elevated a few inches from the ground, having the legs spread about a foot and a half or two feet apart. The weight is grasped with both hands by means of an iron ring which is attached to it, and swung between the legs and then

hurled over one's head. Another method is to stand sidewise, sending the weight as far as possible after having made it cross in front of the body once, twice or thrice. A third way is to grasp the ring with both hands, place the weight to the left of you, give it a sudden swing to the right, at the same time turning the body, make a second revolution and then let go. In studying these different methods, it is well to bear in mind that in the first the back does the chief part of the work, while in the second the muscles at the side of the chest are very important, and in the third method there is much necessity for teaching the body to make its first and second revolutions in perfect harmony, so as to get all the force out of these possible in conjunction with the muscular energy expended. Those who have succeeded in throwing the fifty-six-pound weight well, are fully aware of the time, patience and practice they had to devote to accomplish what they have; and my advice to the novice is: walk conscientiously in the footsteps of the men I have mentioned, study as you go on, and some day you will be rewarded by making an excellent record or becoming a champion.

Throwing the fifty-six-pound weight is not included among the list of athletic events in the Intercollegiate Athletic Association of Amateur Athletes of America, and although it is very interesting, it does not seem to be popular enough to be adopted universally.

The skill and strength required of an athlete to put the fifty-six-pound weight well are of the highest

order, and any athlete who can do this deserves the highest praise for his ability. This event is included more frequently among professional athletic contests, and has long been one of the regular events in the list sanctioned by the Amateur Athletic Union of America.

The knack of throwing the fifty-six-pound weight is not easily acquired. It looks very simple, but when an athlete endeavors to throw the weight for the first time he soon learns that as much, if not more, depends on acquired skill or knack, than on muscular ability. When an athlete is able to combine knack and muscular strength properly he is, as a rule, able to throw the fifty-six-pound weight well, and with little or no strain upon his muscles.

CHAPTER XX.

BICYCLE RACING.

BEFORE considering bicycle racing in detail, there are some general considerations needing careful attention. As a means for recreation it furnishes not only pleasure, but also develops certain parts of the body. It is an excellent exercise, yet there are two great dangers to be guarded against. The first is that it tends to produce a contracted chest, which is caused by the position many riders assume, and the second that it gives too much work to the lower extremities. With a little care, all riders easily can avoid the dangers I have mentioned. The faulty position can be overcome by practice, the erect posture being substituted with very little effort on the part of the rider. To overcome the discrepancy, which is seen in so many bicycle riders, between their lower extremities and the remainder of their body, all that is necessary is to take a few auxiliary exercises with dumbbells, chest-weights, or bar-bells. Those who ride for pleasure rarely if ever know that they would be able to climb a hill with less difficulty if they possessed an equal development of their arms, legs, chest, abdomen and back. Not only will they climb a hill with much more

ease, but they will also be able to ride faster; because when possessing even development and good muscles of the arms, forearms, chest, abdomen and back, they will find that they are able to guide their machine more accurately, and the muscles about the chest, being well developed, will move the ribs a greater distance, thus giving the lungs and heart more space in which to contract and expand.

It may be laid down as a general rule, the larger the muscles covering the chest and back the greater the endurance of the individual who, in addition, has good lung and heart power. Here let me say I have seen hundreds of riders, who had been riding a bicycle for years, try to become expert racers, and never succeed, because they had developed only their lower extremities and neglected the development of their chest and arms. These riders will improve wonderfully if during the winter they will take exercises which develop the chest, back and upper extremities exclusively. To satisfy one's self as to the benefit of symmetrical development, in bicycle riding, all that is necessary is to observe the physiques of such riders as George D. Gideon, Zimmerman, Sanger, Tyler, Bliss, Murphy, Taxis, Sims, Bald, Douglas, Starbuck, and other noted racers.

Riding for pleasure and racing are entirely different. In the latter case it is almost impossible to sit perfectly erect, and many wheelmen ride with their bodies almost at right angles to their legs.

It has been claimed that some machines can be ridden more easily than others. If such is the case it is due either to a very superior make, the care the rider takes of his machine, the running gear, the balance of the machine, the position of the saddle or of the rider.

When purchasing a bicycle it will be well to remember some of the things I have just mentioned. Also examine the tires, spokes, handles, saddle and bearings, to be sure everything is in first-class order. It is a good plan to ask the dealer to allow you to try the machine before purchasing, and during the time you have it compare it with other machines, testing it well over all sorts of roads. In this way you will not waste your money by paying for a bicycle out of which you derive little or no pleasure. If the machine be a "racer," test it upon some track.

Those who ride for pleasure should be very careful when taking a spin, because in so doing there is great danger of straining a muscle, the heart, or lungs, and once having done so you are liable to suffer thereafter. I have seen the pleasure of more than one rider spoiled by disregarding this, and in some cases bicycling had to be stopped. If you must have a spin now and then, pay a little attention to training carefully, until you have your muscles, heart and lungs well prepared for the extra work required, and then you will not expose yourself to the danger of an injury.

Novices frequently injure their health by endeavoring to wheel thirty, forty or fifty miles, at too fast a

pace, with friends who have been riding a wheel for five or six years. They should never attempt to go at such pace until they have accustomed themselves to it. Many novices wheel fifty or more miles with very little apparent fatigue, but the after results frequently cause no end of trouble.

Athletes who are under eighteen or twenty years of age, and who are novices, should be extremely careful as to the distances they ride; because their growth and development are very rapid, especially so after they are fourteen, and from fourteen to eighteen or twenty their bodily tissues are not so strong, hence there is a greater liability to injury. A little care and forethought, with a grain or two of common sense, will be a safeguard to those who intend to seek recreation by riding a bicycle.

To those who have ridden from childhood, I would say there is little danger of injuring your constitution, so long as you respect the laws governing your nature. The only fault children are liable to fall into is that they do not take some additional exercise to make their upper extremities, chest and back equal to their lower extremities in strength and development.

Parents should be very careful in regard to the amount of riding their children indulge in, especially if the children are young, lest overwork and exhaustion follow which may lead to disease. Never allow your child to try to ride so far, or so fast, as a young man of twenty-one, or older, and you will avoid all danger in regard to disease. Impress him that he is to ride for

the benefit of his health, until he is older, when he will be able to stand a greater amount of work with little or no danger. No rider should take a long or fast ride immediately after a meal. Always allow at least an hour or two to intervene, and, if possible, three, before going out upon your bicycle.

There is no harm in taking a ride after the lapse of an hour from the time of eating, provided the pace is a slow one; and one may even ride a few minutes after eating, although it is not the best thing to do. The best way to regulate the velocity when the stomach is full of food and digestion active, is to ride slowly; this does not increase the action of the heart and lungs to any great extent.

TRAINING FOR BICYCLE RACING.

Before beginning to train for bicycle racing develop the unsymmetrical and weak part or parts of your body by taking special exercises in the gymnasium. After having strengthened these parts, giving especial attention to increasing the strength and capacity of the lungs, then begin to take some gentle exercise on the bicycle. From the very moment you start to ride, endeavor to learn all you can about the methods of such men as Zimmerman, Sanger, Titus, Bliss, Murphy, Brandt, Bald, Douglas and others. Until you have perfect control over your wheel pay particular attention to your position on the saddle, your method of pedaling, the control of your handles, and the adjustment of

your wheel. Now allow twelve weeks to condition yourself. The first three weeks devote to endurance, by riding say five or ten miles, at a fair rate of speed. The second three weeks pay attention to riding a quarter of a mile two or three times, or a half mile, in addition to the other work. The third three weeks you may ride one day for endurance by riding five or ten miles, and on alternate days go a quarter or a half a mile once or twice for speed. The last three weeks devote to speed, riding at a very fast rate, always having a little reserve force. This is a general way of training.

Let us now consider the matter of training for different distances. In all distances from a quarter of a mile to twenty miles, the rider should train both for speed and endurance. Many a rider has been beaten because he possessed endurance when he needed a little speed, or had speed when he needed endurance. To ride a quarter of a mile very fast requires faithful training and a well-developed body. The time allotted to training for a quarter of a mile is twelve weeks, as it should be for every event. The first three weeks should be spent in riding a mile or two at a rate of speed sufficient to cause gentle fatigue, not only of the muscles, but also of the heart and lungs. The second three weeks the pace should be increased until moderate fatigue results, and the rider should also ride a quarter of a mile once or twice at about three-fourths of his top speed. The third three weeks may be spent

in riding a mile at a considerably faster rate of speed than the rider had gone the two miles during his first six weeks of training. He should, after having rested sufficiently, say about a half an hour, ride two or three quarters as before. The last three weeks should be devoted to riding fast quarters at about seven-eighths speed.

If the rider feels that he is falling off in endurance he may take a mile or two twice a week. It is also a good plan to take a few sprints of from one hundred and fifty to two hundred yards occasionally. In so doing the rider will avoid the danger of being beaten just on the tape, and will never be outwitted by a competitor who rides a waiting race, for no other purpose than to get him to go slowly in order to outsprint him at the finish. Riders who have a fair amount of speed and excellent endurance should never ride a waiting race, because they will invariably be beaten at the finish by competitors who have excellent speed but only a fair amount of endurance. They should ride, from the very moment the pistol is fired, at a pace they know they can maintain throughout. Cyclers have been beaten by failing to remember this when they might otherwise have won. A rider will be able to judge his pace by practice, and I have already referred to this in my general considerations on training.

Half-mile bicycle riding requires about the same method of training that the quarter-mile requires, but the distance being twice as far, necessitates a little

more enduranee; hence the rider should remember this, and never be beaten because he lacked endurance which could have been acquired had he been more thoughtful. Half-milc bicycle racing has been reduccd to such a remarkably fast rate of speed that it ean safely be said to belong to sprint races. A competitor riding a half mile in one minute or faster has no opportunity to ride a waiting race, and many a eompetitor has been beaten by going the first twenty-five or fifty yards too slowly. Thc only way to ride a half mile is to set the pace at once and work vigorously, with good judgment, from beginning to end.

Twelve weeks should be allotted to training for half-mile bicycle raeing, just as for the quarter. Half-mile riders ean usually get sufficient enduranee by doing from three to five miles daily during the first three weeks. The second three weeks they may wheel two or threc miles at a fair pace every other day, and on alternate days ride half a mile at about threc-quarters speed. The third three weeks may be spent by riding a mile on alternate days; the other days being devoted to riding a half mile at about seven-eighths spced. The last three weeks should be devoted chiefly to speed. Let the rider sprint a fast quarter and repeat it once or twice, during the first week of the last three. During the seeond week let him ride six hundred and sixty yards and repeat. Should he wish to ride a half-mile trial, he may do so once a week. The last week let him take two or three half-miles, say at about

nine-tenths speed ; do not ride trials. The last day or two of the week, rest, and you will be ready for your race.

Riding a mile requires a little more care than riding a half mile, because one is apt to "wind" himself before the distance has been covered, by going somewhat too fast at first. It requires a great deal of keen judgment when racing a mile, because one must learn to ride so that he will have a little energy left in him for the final spurt of from one to three hundred yards. Do not allow yourself to be caught "napping," so to speak, by riders of experience. That is, do not allow another competitor to trail after you until you get to the last two, three, or four hundred yards, and then suddenly spurt by you before you are aware of it, and get so far ahead that it is impossible to catch up. Always look out for this.

Moreover, be careful in all kinds of bicycle racing not to get "pocketed" as it is called. By this is meant that two or three competitors will ride very fast at the start so that they may get ahead of you, especially if you are a good wheelman ; and once having attained the lead they will ride side by side so as to compel you to go to the extreme outside in order to pass them, thus causing you to lose much valuable time. This is not all. When you endeavor to pass they will quicken their pace and not allow you to do so if they can help it. Bear in mind that it is not only best to keep from being pocketed, but you are also

avoiding the danger of running over some one should there be a "spill" of three or four men ahead of you. If you do get pocketed, ride on the outside at a time when you can ride by one competitor, or try to grasp an opportunity when there is space enough to pass on the inside of the competitor having the pole, or ride between him and the man next to him; but do so when those competitors least expect it, and do it very quickly. I have seen this done beautifully by expert riders, and had they failed to use their brains for this purpose they would have suffered defeat without the shadow of a doubt.

Mile racing requires very much the same training that half-mile requires, but one must have a little more endurance. The number of weeks is the same, and the method of training is the same; but since the distance is twice as far, twice as much endurance is required. Devote the first three weeks to riding from three to six or eight miles at a moderate pace, for endurance. Spend the second three weeks in riding two or three miles at a somewhat faster pace; just fast enough to cause your heart and lungs to come well into play, but not to their utmost extent. Do this three days in the week. The other three ride a fast half or three-quarters, as the distance suits you. The third three weeks ride a mile and a half every other day at a very good pace, which you must judge by the amount of fatigue caused. The alternate days devote to sprinting a quarter mile or half mile as before. If you feel like it go three-quarters

or even a mile. The last three weeks devote chiefly to sprinting. The first week ride a half mile and repeat once or twice; the second week ride three-quarters twice or thrice; and the last week ride a trial mile the first day of the week, never later, and better a whole week before the race. Allow two days' rest, as before. Mile riders should learn to sprint a quarter and a half well, so that they may not be outsprinted.

Riding two miles requires much more endurance than riding one, in fact some men are so constituted that they can race one mile and no further. The moment they attempt to ride a longer distance they are defeated. Such athletes should keep out of all races over one mile. It does not follow that because a person is able to ride a mile faster than some men, he will also ride two miles faster than these men. I have seen men who could give others as much as twenty-five or even fifty yards in a mile; but when the distance was made two miles the latter could give the former as much as twenty-five or fifty yards, because they had more endurance and could stand a much faster pace in proportion for two miles than they could for one. When starting to train for a two-mile bicycle race spend the first three weeks in riding from five to eight miles for endurance. The second three weeks ride three or four miles three days in the week, and devote your time the other three days to riding a moderately fast half mile, repeating once or twice. The third three weeks ride two miles at a good pace and

sprint a half mile once, each day. The last three weeks devote the first week to increasing your speed by riding a mile at three-quarters speed, repeating once or twice. The second week of this period ride a mile and a half and repeat, at about seven-eighths speed. The last week ride a trial the first day, the next two days take one or two sprints of a mile, and rest two days as before.

For distances such as five, ten, and twenty miles the training is somewhat the same, increasing the distance accordingly. One must always make allowance for endurance and speed according to the individual. Further, a very rigid observation should be made each day in regard to the effect of the work.

Should one feel that he is not training hard enough for any of the above events, then he should take more work. On the other hand, if he is taking too much work, then he should rest for as long a period as necessary. This may be a day or two, a few days, a week, or even a month. A rest of a month is required only when a person is exceedingly "stale." One may readily know when he is getting toc much work by the fact that he will not be able to make such good time. A variance from a quarter of a second to one or even two seconds, according to the distance being ridden, means little or nothing; but when there is a difference of from five to ten seconds, then beware of becoming "stale," unless the track is a slow one, the day raw, cold and damp, or the wind blowing very hard. If you suspect something which interferes with making fast

time and you cannot understand the cause of it, consult a physician who can give you skillful advice on the subject. It is bad policy to endeavor to patch yourself up with the advice of a quack, when there is something wrong, and in the long run you will save much valuable time by seeking good medical advice.

All men who ride in races should always inspect the track where they are going to race, in order that they may become familiar with the curves and may note any irregularities in them. Some tracks have soft spots in them, others are so constructed that the racer will find it difficult to ride around the curves with any certainty and speed, unless he has tried doing so once or twice before racing.

A rider should learn to lean well to the inside of his machine as he goes around a curve. Tracks that have the curves well elevated do not require so much attention in this respect, but every rider who enters races will soon find that few tracks are fast while many are very slow and imperfectly built.

When preparing to start in a race never allow a competitor to crowd you after you have once mounted. See that there is plenty of room on each side of you. Crowding is frequently done by riders who wish to spoil your chances and who will either pocket you the moment you start or give you a fall before you have gone a dozen or more yards, so that a friend of theirs may win when their own chances are hopeless. Also examine your wheel well just before mounting it.

CHAPTER XXI.

FOOTBALL.

THE remarks in the chapter on "Training in General" will apply to conditioning the athlete for a football contest; but there are a few special hints which are of inestimable value to him. It is not my intention to speak of the scientific part of the game, because I am fully aware of the fact that such men as George Woodruff, of Yale, Phil King, of Princeton, Arthur Brewer, of Harvard, and Carl Williams, of the University of Pennsylvania, are far more expert players than I ever was.

I venture to assert, however, that every one of the gentlemen whose names I have mentioned will agree with me when I say that the possession of good brains, *per se*, will never enable an athlete to become an expert football player. If a player cannot use his brains at the right time, he will never become an expert, because his opportunities on the day of a very important match may be so modified from what they were in practice that he will be totally nonplused before he is aware of it, and his opponent will thus gain the very advantage which leads to victory. Moreover, good brains when

properly used co-ordinate voluntary muscular movements more easily and perfectly than when misapplied, and with less expenditure of energy.

No athlete can ever become an expert football player unless he first possesses the following qualities. He must have a good mind, and possess excellent control of his muscles and temper. He must be a good runner, a good tackler, be able to pass the ball well, think quickly, able to dodge well, able to punt and catch the ball well, understand the rules of the game thoroughly, be able to interfere well, understand the different plays perfectly, always be on the lookout for any emergency, and obey the orders of his captain without a question. Furthermore, he must possess the qualities of forethought, patience, perseverance, determination and decision, and must be a most faithful, conscientious and constant student and worker, because there are so many signals to be remembered and "tricks" constantly to be borne in mind.

All of the qualities I have mentioned are rarely found in athletes who play football, and while some men play well, yet they are always inferior to one or two of the members of the team who possess them. There is no reason why every member of a football eleven should not become an expert player, and in fact a "star," if he will only study his weak points. The fault with him often lies in the fact that, being desirous of getting on the team, he carefully avoids showing the coach and the captain his weak points ; during daily

practice he avoids these, and is careful to keep his strong points before both coach and captain. The effect of all this is that when he does make the team he frequently finds himself confronted with the fact that his opponents know his weak points, and they continually use plays calculated to call out his weaknesses, not once using a play that tests his strong points.

Again, there are some football players who think they know all that can be known about the game, and are never willing to study it constantly and listen to the experience of the coach and captain. These men, in fact, are poor, or at best fair players, and are too short-sighted to see their own faults. Many a football player thinks because he is a good tackler and a fair runner, that he should be on the team. He forgets that these two qualities alone do not make a football player; but because he is able to tackle better and run a little faster than another candidate, he concludes that he deserves a place on the team. This is far from correct, because another candidate who is trying for the team, although he may not be quite so good a tackler and runner, is a better punter, a surer catch, is more reliable when the ball is passed to him, interferes better, and obeys his captain more faithfully.

A point that is extremely essential in football is that every member of the team should be a good sprinter. It is surprising to see how many poor runners there are on football teams. The rush line is composed of heavy men, and until recently it was supposed that the weight

of each man, the ends excepted, prevented him from being a fast runner. Mr. Bull, who played center-rush on the University of Pennsylvania team in 1894 demonstrated that this was a mistake. He frequently broke through his opponents' center, and beat the ends of his own side down the field to the opponent to whom the ball had been punted. This proved conclusively that a heavy man on the rush line could run faster than the ends.

The guards and tackles should be able to run just as fast as the center or ends, and I firmly believe that the fault lies in the fact that the rush line, as a whole, never practices sprint running. Mr. Hefflefinger, who played left guard for Yale, was a very heavy man, weighing in the neighborhood of two hundred pounds; and half of his excellent playing was due to the combination of his weight, fast running and good interference.

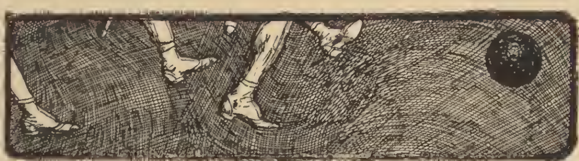
There is a point worth mentioning in reference to the members of a football team when they allow themselves to have contentions with the members of their own as well as other teams. Their contentions or disputes tend to irritate the brain, and when this irritation once takes place it acts as a cause in disturbing the perfect co-ordination of movement. From this the muscles do not contract and relax with such perfect rhythm; the result often being that a player will fumble the ball when passed to him, or when about to fall upon it. A good player will frequently be at a

loss to account for fumbling the ball, when if he would stop to think, it could be explained by the fact I have mentioned.

The scientific parts of football, comprising the many tricks, signals, the art of punting, falling upon the ball, etc., have not been mentioned, because I am well aware I could not put them so clearly before my readers as Mr. A. H. Stagg and Mr. H. L. Williams have done in their excellent work, "A Treatise on Football," or Mr. Walter Camp and Mr. Deland in their book on this subject. To those who care to become expert football players I would say that it is the ever-increasing desire for knowledge of the subject that tells in the long run, and the man who studies the game carefully and adds to his studies a course of training the body scientifically, is the one who excels.

A great weakness I have frequently noticed is that many players when once tackled by an opponent do not try to shake him off, but simply cry "down." If these men would learn how to use the muscles which are intended to give a rotary movement to the body, and once get them well under control, they would be surprised to find how comparatively easy it is to shake a man off. Again, players when tackled are frequently thrown upon the ground by an opponent, and after being thus thrown have an opportunity to roll over three or four times, but do not take advantage of it. Further than this, an opportunity often presents itself by which a player having the ball may crawl several feet or yards before

it becomes necessary to cry "down." Such an opportunity should always be taken advantage of. An additional point is that a player running with the ball does not look for an opportunity to pass the ball to one of his own side when an opponent is about to tackle him. This is often due to the fact that the man with the ball is not followed closely enough by one of his own side.



CHAPTER XXII.

BASKET-BALL.

BASKET-BALL is a game which was invented within the last few years, and its inventor, Mr. James Narsmith, deserves great credit for introducing a game that may be played in any gymnasium, or on a small space. I have watched games of basket-ball with a great deal of interest, and have been impressed with a condition which, it seems to me, will present itself as the game continues to be played, namely, that it is capable of more scientific development. True, there is a great deal of science in the game, but I firmly believe that time will demonstrate that the fine points of the game are still in their infancy. Fifteen years ago no one thought football would improve so much, and basket-ball will advance along scientific lines just as football has. In fact it is advancing every day, and new plays and "tricks" are the outcome of some of the "brainy" players.

The popularity of the game is evident from the number of teams and leagues existing throughout the United States. It is a game that is less violent than football. It requires that an athlete should be in good

physical condition, but does not necessitate such severe training as football or track athletics. Furthermore, basket-ball may be played during the winter months when football is out of season, and basket-ball does not consume much time, since each half is limited to twenty minutes.

The rules are so worded that all roughness is eliminated from the game, and owing to this, more pleasure is enjoyed by those who play basket-ball. To one watching the game, unless he is posted on the fine points, it would seem that there is very little to be learned; but let anyone who has never played basket-ball try to do so, and if he is playing against an expert he will soon find that there is more to be learned than he anticipated. His opponent will not have the slightest difficulty in executing plays that lead to a goal. On the other hand, when two teams are evenly matched the game frequently results in a draw, and in some instances neither side is able to score.

No person can learn to play basket-ball well unless he is very quick in his movements, and very accurate in manipulating the ball in different ways. All basket-ball players should teach themselves to handle the ball equally well with the right and left hands. It often happens that a chance is afforded to pass the ball with the left hand; but the player, being right-handed, is unable to do so and thus loses an opportunity which might lead to victory. It is a very difficult matter to learn to use both hands equally well, yet I have seen

men who could do this, and they invariably gained a great advantage.

A great many players never study rules closely, and on this account are led to think that the officials are treating them unfairly. It is far better not to dispute official decisions, because in the great majority of cases the players are at fault. Ignorance of rules, in detail, also leads players to make a foul, and from this a goal may result, which defeats a team. Every man on a basket-ball team should know the rules so well that he can repeat them word for word. If the rules are thoroughly understood there is little cause for disputes, and the referee's or umpire's decision will readily appear just.

In all league games the number of men composing a team is limited to five. A greater number may be played if desirable.

The positions are as follows: one center, two guards and two forwards. For a detailed account of these positions the reader is referred to the writings of Mr. W. E. Allen, which will be found in the book "Official Basket-ball Rules."

Some of the fine points which he recommends to the man who plays center are: "He should be an all-round player, be accurate in throwing goals, work willingly with the forwards, be able to 'cover' an opponent, and, above all, be cool and collected." The center should be a tall man rather than a short one, and I would add that it is well for him to practice jumping up

in the air so that he may be able to jump higher than his opponent when the ball is put into play. The matter of catching or striking the ball may be left to the discretion of the center, but most players prefer to strike the ball. The position the center assumes to "cover" his opponent must be decided upon according to circumstances. At one time it may be best to face an opponent, at another to stand sidewise, and in a third instance behind him. The center should watch with the utmost diligence the manner in which the ball is thrown into the air.

THE GUARD.

This position has more responsibility attached to it than the center, and a guard should be especially careful not to be slow, lest he may lose the game. Height is not so essential in this position, yet if a man be tall and just as quick as an opponent who is short, he will have a decided advantage. A guard must watch the ball closely and also "cover" his opponent with the utmost accuracy, or a goal may be the result. He should also study the points of the other guards and use plays that will call their weak ones out. With a little careful observation these points may be quickly learned. I have seen guards learn the weak points of those against whom they were playing, during the first five or ten minutes of the first half; the result being that they completely outplayed their opponents the second half. The guard should have a signal by

which he may indicate exactly where he wishes the ball to be dropped, and should play in reference to his position. The signal should be such that it will lead an opponent to think he knows what is about to happen, when in reality something entirely different takes place. This is brain work of the highest order. When a guard wishes to get the ball, unless he is an expert he should not stand behind an opponent, because he is liable to make a foul. Even the most expert guards will sometimes make a foul when standing behind a man. When throwing the ball any distance it should be done quickly, and not with the arms extended, because in this position the leverage is not so favorable as when the fore-arm is flexed upon the arm. Moreover, an opponent has more time to watch the movement. The ball may be kept just back of and above the shoulder, resembling the position one assumes in shot-putting. From this position one may teach himself to throw the ball a great distance, and by practice may also become very expert in judging goals.

THE FORWARD.

This position is regarded by many basket-ball players as the most difficult, but this is disputed by others who think that the position of guard is more important. The man who plays forward should excel in one particular, and that is in the matter of throwing goals. The one qualification which fits a man for the position of forward, is an accurate control over the muscles of the

arms. I have assumed that the forward must be quick, or his accuracy in throwing a goal will amount to nothing, because he will not be able to move to the proper point at the proper time. To exemplify this I quote the words of Mr. W. E. Allen: "In the first instance the ball was passed from one side of the field near the goal to a man on the other. Although he was well guarded and in a poor position for throwing, he threw for goal and missed. The next will show what his better play would have been. Much the same kind of a pass was made; but the ball was passed back; this was done once or twice. The man who made the first pass then bounded it on the floor until both backs attempted to cover him. By this time his fellow forward was almost underneath the goal, and with a clear field. A quick throw put the ball in his possession, and the throw was made This was scientific basket-ball."

In regard to team play in basket-ball, I may say that it is just as essential as it is in baseball or football. No player should endeavor to show his brilliancy at the expense of team play. He may occasionally make a goal and thus win a victory for his team, but more defeats will follow when team play is neglected for individual playing. It is hard to make some basket-ball players believe this, and they will cite an instance where they have won a game by their individual playing. It is only by suffering defeat several times thereafter that they learn, by bitter experience, what they might have learned by taking a little timely advice.

It is not an easy matter to teach a team to work scientifically and together. Each man must be studied, his work must be planned carefully, his disposition must be a pleasant one, he must be a careful and conscientious worker, and above all must do as he is told by the person coaching him. Every team that plays basket-ball should have a code of signals, and no man should be allowed to play in a league game unless he knows every signal perfectly. The slightest mistake in a single signal, frequently is sufficient to defeat an excellent team.

Basket-ball players should take additional exercises calculated to develop their wind. If a team is able to play fast enough and keep it up any length of time, it will soon have the opposing team winded and will be able to play all around its members. I would advise basket-ball players to cultivate a good wind, so that they may have the requisite amount of endurance for a hard, fast game.

Basket-ball is of especial benefit because it brings a great many muscles into play. It also strengthens the heart and lungs and develops them. The action on the brain is one that requires quick thought, precision, coolness, and accuracy. It also by increasing the circulation increases the action of the skin, and by establishing the process of perspiration rids the skin of products which, if retained, prove noxious. Further, it is not a violent and rough game, and therefore may be played by girls and women also. The exercise

caused by basket-ball has a tonic effect and it affords pleasure.

Basket-ball is of great benefit as a discipline to mental training, because the man who becomes an expert player must train his mind so thoroughly, in the strategy of the game, that it undergoes the severest kind of work.

Good basket-ball players, as other athletes, are not made in a day. The game is so full of strategy that it requires years of hard, conscientious practice; and I firmly believe that the man who becomes a good player will, other things being equal, be successful in other sports.

I think there is one way the game could be improved, and that is by stretching a net along the sides at a height that would prevent the ball from going out of bounds. It is very common to see a beautiful play spoiled by having the ball go out of bounds, and in addition to this there would not be so many delays. The playing would also be more continuous, and from this there would be a better opportunity to work "tricks" and signals. Continuous playing would likewise add more interest not only on the part of the teams but also on that of the spectators. A rule easily could be formulated whereby the ball must touch the floor, after striking the net, before a player may touch it, under the penalty of a foul.

CONCLUSION.

I trust those who read this book will be charitable as to my mentioning tricks. I have seen them again and again, and I am only guarding the more noble athletes who never allow themselves to be censured for a mean trick. Honest athletes never think of such meanness and are far above anything of the kind. Again, novices by being informed of these tricks are prepared for them when they enter a race, and do not have to learn their lessons by experience, which is often a very sad teacher. I hope to see the day when the honesty of an athlete will be beyond a shadow of doubt; and with the increasing interest and care which are now being taken by amateur athletic associations to keep out all professional tricks, I feel sure the day is not far distant when such will be the case.

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